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The Victorian Naturalist

The Magazine of the
FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated
THE MICROSCOPICAL SOCIETY OF VICTORIA

Vol. 95
January—December, 1978

COMPILED BY JAMES A. BAINES

MELBOURNE:
JENKIN BUXTON PRINTERS PTY. LTD.
1-13 Abbotsford Street, West Melbourne, 3003

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the victorian naturalist

Vol.95, No.1 January/February, 1978

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
in which is incorporated the Microscopical Society of Victoria

$1.20

Category "B"

Registered in Australia for transmission by post as a periodical.

FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra

Monday, 13 February, 8.00 p.m.
Speaker: Mr Robert Burn, Honorary Associate in Invertebrates, National Museum of Victoria.
Subject: "Victorian Nudibranchs".

Wednesday, 15 March, 8.00 p.m. Note: this is Wednesday not Monday because of Moomba.
Speaker: Members of FNCV Microscopy Group.
Subject: "Introduction to microscopes, how to choose one, etc"; see page 22.

Monday, 10 April, 8.00 p.m.
Speaker: Dr Bill Birch, Curator of Minerals, National Museum of Victoria.
Subject: "Victorian Minerals".

New Members — February General Meeting

Ordinary:
Mr A. W. Deverall, 6 Glenluss Street, Balwyn, 3103. Flora and fauna.
Mrs G. Gregory, 11 Copelin Street, South Yarra, 3142. Mammal survey.
Mr A. R. Lawson, 50 Tivoli Road, South Yarra, 3141. Flora and fauna.
Mr R. J. Riddell, 13 Carmichael Street, East Ivanhoe, 3079. Geology, botany.

Joint members:
Mr and Mrs E. R. Harrison, 4 Croft Street, Essendon, 3040. Marine biology and mammal survey.
Mr Colin Kitchen and Mrs Phyllis Kitchen, 91 Berkeley Street, Hawthorn, 3122.

Country members:
Mrs Pearl Reeves, 7 Whittakers Road, Traralgon, 3844.
Mr J. Featherstone, Deans Marsh, 3235.
T. Dudley Hagger, "Willunga", Maroondah Parade, Healesville, 3777.
Mr E. G. Errey, 3 Leonard Street, Belmont, 3216.
Mr G. W. Beaton, 4 Eighth Street, Eildon, 3713.

Overseas subscription:
Mr and Mrs. B. Klingeberg, 15 Trillium Village, Apt 203, Chatham, Ontario, Canada.

FNCV EXCURSIONS

Sunday, 19 February. Entomology excursion led by Mr Peter Kelly. Destination dependant on weather. Meet at Batman Avenue, 9.30 a.m. Fare $5.00. Bring one meal and a snack.

Saturday, 11 March-Monday, 13 March. Creswick is the venue for this year's weekend gathering of the Victorian Field Naturalist Clubs Association and the Creswick FNC will be host. Full details are not yet available but there will be an afternoon excursion on Saturday, a full day excursion on Sunday and a morning trip on Monday. Transport will be by private cars, and it would be appreciated if any members having a spare seat would invite others without transport. Most naturalists will be camping and details of the site will be given at club meetings. Those wishing accommodation should make their own arrangements and, as accommodation at Creswick is limited, early booking is advisable. Or accommodation could be obtained at Ballarat 11 miles away.

Easter: Friday 24 March-Tuesday 28 March. Apollo Bay. Coach and DBB accommodation, approx. cost $100. Details from Excursion Secretary.

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Cover illustration: Koala *Phascolarctus cinereus* is probably the best loved and possibly the least intelligent of Australia's animals. See page 35 for a layman's collection of facts. Photo by Graham Pizzey.

The First Victorian and other Victorian records of the Little Pigmy Possum *Cercartetus lepidus* (Thomas).

BY JOAN M. DIXON.*

Prior to 1964, *Cercartetus lepidus* was known as a living species only from Tasmania. In that year, a specimen was collected at Kangaroo Island and noted by Aitken (1967). Additional specimens were collected from the island at a later date, and detailed information on the general biology of the species on Kangaroo Island published by Aitken (1974).

No specimens of *C. lepidus* were recorded from mainland Australia before 1976, when a pair was collected 46 km SSW of Pinnaroo (Aitken, 1977).

Fossil and sub-fossil material of *C. lepidus* has been recorded from the Australian mainland. Sub-fossil specimens of *C. lepidus* have been recorded from a large area of eastern and central Victoria and from coastal New South Wales (Ride 1960) and Wakefield (1960). In his paper "The Australian Pigmy Possums", Wakefield (1963) commented that *C. nanus* had replaced *C. lepidus* to a considerable degree in the Pyramids area near Buchan, Victoria. He considered that this development may have been linked with vegetational change from wet to dry sclerophyll forests in earlier geological periods. He did not indicate that fossils were known from semi-arid or Mallee situations or heath mallee complexes which occurred in Western Victoria and which are now proving to be the habitat for a number of small mammal species.

Aitken (1977) commented that the discovery of a specimen in a relatively harsh climate on the mainland indicates that they are not so dependent on wet, cool conditions as was formerly supposed, and that future collecting could extend their known distribution considerably.

On 9th April 1976, several specimens of *Cercartetus* were collected 5½ km south of Millewa Bore, 2 km north of Rockhole Bore South, in the Sunset area of the Victorian Mallee (Lat. 34° 49′ S, Long. 141° 3′ E approx) by P. Brown and A. J. Coventry. These were recognised as *C. concinnus*, until July 1977 when one of the specimens which had died in March 1977 was donated to the National Museum of Victoria. This specimen, a female, is now registered as C 17246 in the Museum collections. It had been eviscerated prior to donation, and the pouch condition could not be determined. From the body dimensions and general colouration, it was evident that the specimen was *Cercartetus lepidus* and constituted the first record of that species from Victoria. Measurements in Table 1 follow Cockrum (1955), and are in millimetres.

Table 1
Measurements of *Cercartetus lepidus*, female, National Museum of Victoria No. C 17246

Body dimensions.	
Body length	134mm
Tail length	65mm
Length of hind foot minus claw	6.4mm
Height of ear from notch	14mm
Greatest width of ear	11.8mm
Skull and tooth dimensions:	
Greatest length of skull	18.9mm
Crown length m 1-3	2.4mm
Crown length m 4	.4mm
Greatest length of skull	18.9mm
Rostral length to lachrymal fossa	6.2mm
Zygomatic breadth	11.0mm
Greatest width across the upper molars	5.5mm
Palatal length	9.2mm
Depth of cranium	8.5mm
Crown length ml-3	2.4mm
Crown length m 4	4mm
Crown width m 4	5mm
Length of mandible	13.0mm
Crown length m 4	4mm
Crown width m 4	4mm

*Curator of Vertebrates, National Museum of Victoria

1. Habitat of *Cercartetus lepidus* in Millewa Bore area, Victorian Mallee Photo: A.J.Coventry.

Habitat

Some information on the soil and vegetation of the area is available from photos taken at the time of collection. The soil is yellow-brown sand, with tree cover of *Eucalyptus incrassata*, the shrub layer includes *Leptospermum laevigatum*, and ground cover *Triodia irritans*, from which the present specimen was retrieved (Figs. 1 and 2). The area is part of the Berook Land System of the Sunset block of the Victorian Mallee, as defined by the Land Conservation Council of Victoria, 1974. It belongs to the Big Desert land system, which is characterised by irregular dunes and plains, with a rainfall between 320 and 375 mm, and vegetation comprising mallee heath and scrub. The dominant soils are deep sands, and erosion is severe.

Morphological features

The external features of the Millewa specimen agreed well with those described for the species by Thomas (1888). The areas of the chest and belly are particularly characteristic, being a dark, slatey grey for most of their length and having creamish-white tips. This contrasts with *C. concinnus* where the chest and belly are pure white. The new record had a swollen tail similar to that of *C. nanus*, the basal half inch furred and the remainder finely haired with minute scales. This is markedly different from the non-incrassated tail of *C. concinnus*.

Apart from external features, the main method of determination of *C. lepidus* is based on cranial morphology. Thomas (1888) commented that there were four molar teeth in this species and also that it had been identified as the young of *C. nanus* prior to his work. There appears to be considerable variation in cranial features in the genus, but identification is straightforward when the following distinguishing characteristics are compared. In *C. lepidus*, P_4

Fig. 2. *Cercartetus lepidus* in *Triodia irritans* clumps, Millewa Bore area. Photo A. J. Coventry

projects just below the tips of the molars in the upper jaw. It lacks a posterior cusp, but has a slightly bifid-tipped main cusp, the anteriormost of which is shortest. There are four molars, which decrease in size from anterior to posterior, and M_4 is quite minute.

In the lower jaw, P_4 is considerably higher than the molars, having a bifid extremity with equal points, and four molars, of which M_4 is quite small.

In *C. nanus*, P_4 is very large and strong with a pointed main cusp, corresponding to the bifid cusp of *C. lepidus* and a permanent secondary posterior one, almost or quite as high as the tips of the molars. In both upper and lower jaws, there are three molars only. In *C. concinnus*, P_4 is large, pointed, markedly higher than the molars, but bifid at the extremity, and lacks a posterior cusp. There are three molars only in *C. concinnus*.

There appears to be considerable variation in the fourth molar in *C. lepidus*. This may be minute or even absent. In the Millewa specimen, C 17246, M_4 is present on the left maxilla only, but is found on both mandibles. It is sub-circular rather than triangular in section. (Figs. 3 and 4).

Fig. 3. Cranium of *Cercartetus lepidus* C 17246, ventral aspect. Photo F. Coffa

Other Victorian Records of *Cercartetus lepidus*

Subsequent to identification of the first specimen, a second record of the species was found on the ground 10 km south of Moonlight Tank on the Murrayville track, Big Desert, (Lat. 35° 46' S, Long. 114° 23' E approx), April, 1977, by J. Wainer. The skull was in poor condition, discoloured and incomplete, but could be identified as *C. lepidus*. The cranium is damaged in the region of M_4, but in the mandibles, a minute almost ovate M_4 is in evidence. This specimen is registered as C 17247 in the Museum collections.

The area is part of the Big Desert Land system of the Big Desert block of the Victorian Mallee, as defined by the Land Conservation Council (1974). White sands predominate throughout and annual rainfall (320-375 mm) is higher than in the Berook land system. Vegetation comprises mallee heath and scrub mallee. Dominant soils are

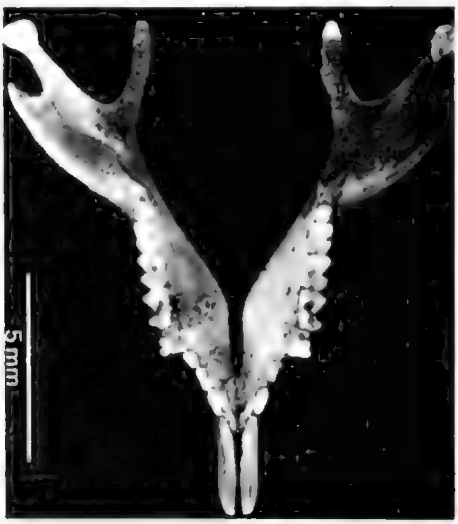

Fig. 4. Mandibles of *Cercartetus lepidus* C 17246, occlusal aspect. Photo F. Coffa

deep sands, and the area is prone to erosion.

A third specimen was collected a few hundred metres south of an unnamed bore on the Nhill to Murrayville road, October, 1977 (Lat. 36° 50′ S, Long. 141° 25′ E approx), from an insect pitfall trap by M. Fleming. It is registered as C 17248 in the National Museum of Victoria collections. Vegetation in this area is a mallee heath with *Eucalyptus incrassata* and *E.foecunda* forming the tree cover, a shrub cover including *Leptospermum laevigatum, Casuarina muellerana* (the most common species), and *Pultenaea prostrata*, and ground cover of *Astroloma humifusum* and *Triodia irritans*.

Significance

The Victorian Mallee contains a wide range of mammal species. The occurrence of Pigmy Possums of two species in the area is significant and the northern extension of range of *C. lepidus* is yet a further step in determining the mammal fauna of desert areas. The locality of the Millewa record is in uncommitted land close to the boundary of land which may be used for dispersed mobile military training and is just north of land set aside for limited cultivation lease (L.C.C. 1977).

The specimen from Moonlight Tank area is in uncommitted crown land which is also zoned for dispersed mobile military training (L.C.C. 1977). No faunal reserves have been set aside in this area. Further investigations into this and other desert species are necessary to provide detailed information on their distribution and general biology, and to enable some criteria of their vulnerability to varied land uses to be determined.

Acknowledgements

Thanks are extended to the following persons who contributed information or technical assistance in the preparation of this paper: P. Brown of the Sir Colin Mackenzie Fauna Park, J. Wainer, University of Melbourne Zoology Dept., M. Fleming and A. Cockburn, Monash University Zoology Department, A. J. Coventry, F. Coffa and J. Freeman, National Museum of Victoria.

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Natural History Medallion Fund

Donations from persons and organisations wishing to help this Fund will be appreciated and acknowledged.

Amount invested as at 31 December 1977	$466.00
Mr Eric R. Allan	30.00
Mr and Mrs Corrick	10.00
Total	$506.00

Conodonts — Enigmatic Microfossils

By Barry J. Cooper*

The present world contains such a wide diversity of animals that few people can hope to appreciate all variations and adaptions. The animal world of the past, embracing many hundreds of millions of years gone by, encompass an even greater diversity than that of the present and includes many extinct groups.

One extinct group of animals, studied more extensively than others because of their value to geologists, are the problematic creatures that beared conodonts. Conodonts are microscopic teeth-like fossils composed of calcium phosphate. The animals bearing them (conodontophorids) flourished in the seas during the Palaeozoic era along with the extinct trilobites, graptolites and tabulate corals. The conodont elements probably served as a body support or assisted feeding in these animals. Present evidence indicates that the last conodontophorid perished near the end of the Triassic period.

What are they?

The inevitable question that arises when one sees conodonts for the first time under a microscope is,

"What are they?"

My friends usually cannot hide a smile when I admit,

"I don't know".

Conodontophorids, in contrast with most extinct animal groups have no known living relatives and their preservable skeleton (the conodonts themselves) almost always scatter after death.

Biologists over the past century have postulated that conodontophorids show affinities to almost every known animal Phyla and one worker has recently suggested that conodonts might even be formed by algae. No one hypothesis has gained favour amongst the majority of conodont workers.

Recently William Melton discovered a number of exceptionally well preserved fossils broadly resembling primitive fish at a Carboniferous locality in Montana (U.S.A.) and containing conodont elements within the body. Many conodontologists were satisfied that the remains of the complete conodontophorid had been found and cautiously accepted Melton's suggested distant relationship to the vertebrates. Other specialists were sceptical of Melton's discovery pointing out that the animal under consideration was probably a conodontophorid eater rather than the conodontophorid itself.

So the mystery, persists. Many palaeontologists nowadays prefer to place the conodontophorids in a separate phylum distinct from all other living things.

Discovery

Conodonts were discovered by Christian Heinrich Pander (1794-1865). His specimens were extracted from strata of Ordovician age near St. Petersberg (now Leningrad) in Russia. Pander recognised the enigmatic nature of his discovery and sent specimens to many prominent geologists of the day for comment. Finally in 1856, he published a monograph describing his find.

For 70 years after Pander's death, conodonts remained as curiosities to the scientific world. Then in the 1920s and 1930s American geologists (notably E. B. Branson and M. G. Mehl at the University of Missouri) became aware of the great diversity of conodonts, their wide occurrence and consequently their value in the relative dating of rocks. Another tool to enravel the mysteries of the Palaeozoic successions had been realised and by 1975 over 350 palaeontologists throughout the world were studying the group.

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Initially palaeontologists searched for conodonts by splitting shale and scanning the bedding planes with a hand lens. By 1950, the use of acetic acid in disaggregating limestones was accepted. This chemical breaks down the calcium carbonate in limestones without damaging the conodonts, which are composed of calcium phosphate. The acid disaggregation technique revolutionised conodont study as limestones yield the most abundant conodont collections.

What Value!

To specialists in the 1950s, conodonts held the promise of being the ideal Palaeozoic index or guide fossil. In the platform limestone rocks of Europe and North

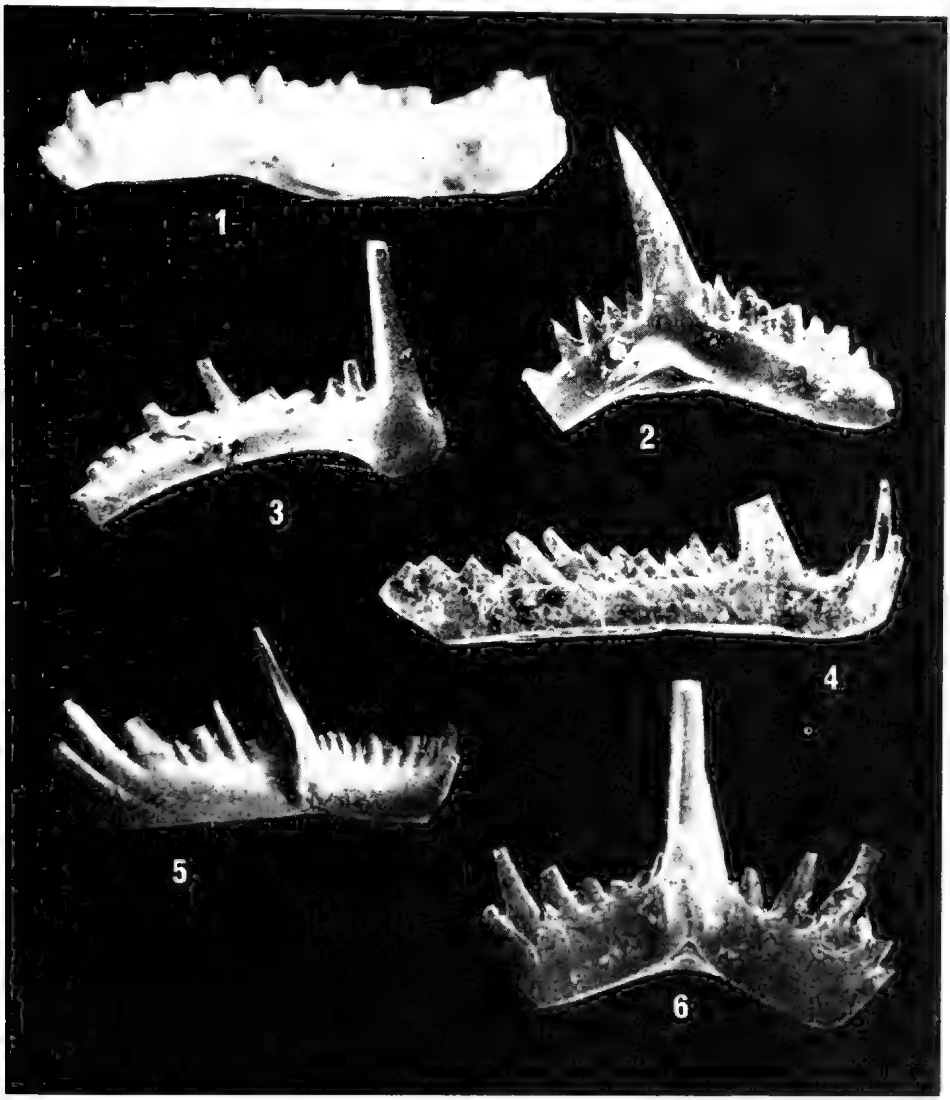

Fig. 1—*Ozarkodina excavata* (Branson & Mehl).
1, Pa element. 2, Pb element. 3, M element. 4, Sc element. 5, Sb element. 6, Sa element. All specimens are magnified at x60 and photographed using the Scanning Electron Microscope. Elements illustrated here are from the Upper Silurian Yarrangobilly Limestone, S.E. New South Wales.

America, conodonts were prolific, and evolved so rapidly that correlation of rock successions between different areas was possible at a degree of refinement greater than ever before. The conodontophorid seemed to show little ecologic preference and was obviously a free swimming or at least a floating creature. The small size of conodonts was also important as it was possible to extract useful collections from small pieces of core retrieved from deep oil wells and other borings

The value of conodonts in unravelling the age of strata is now well established. The high promise of the group has been fulfilled although a few problems have surfaced. Like all animals, the conodontophorid does show some environmental dependence and this may prove an obstacle to world wide correlation. Conodonts do not occur in all marine rocks and technologically palaeontologists have great problems in extracting them from some sandstones and black shales. Also recent palaeontological ad-

Fig. 2—1, Triangular element of *Belodella resima* (Philip), x60, from Lower Devonian limestone, Tyers near Moe. 2, Costate element of *Panderodus unicostatus* (Branson & Mehl), x60 from Upper Silurian Yarrangobilly Limestone, S E. New South Wales.

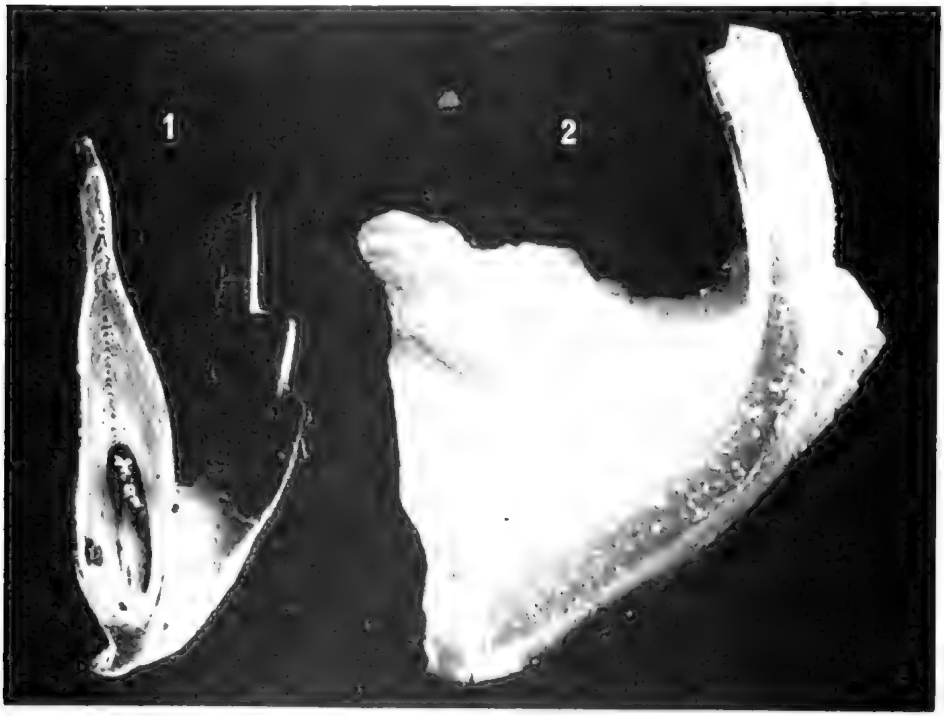

Fig. 3—Lenticular element of *Belodella anomalis* Cooper. 1, Basal view, x200. 2, Lateral view, x150. Specimens from Upper Silurian Yarrangobilly Limestone, S E. New South Wales

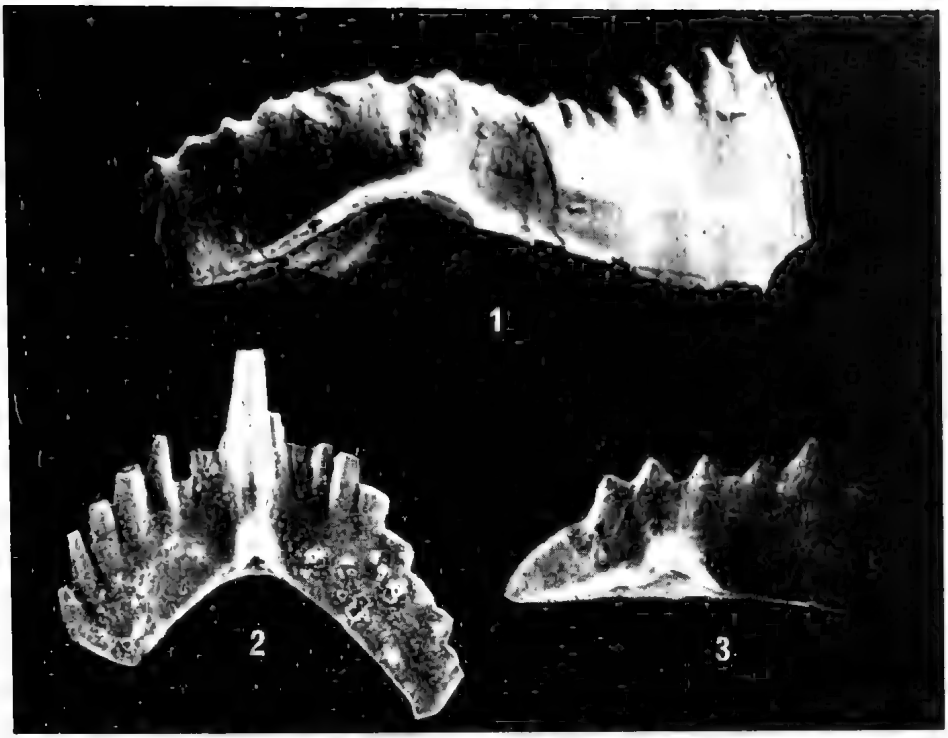

Fig. 4—1, Pa element of *Eognathodus trilinearis* (Cooper), x60, from Lower Devonian limestone at Loyola near Mansfield. 2, Sa element of *Ozarkodina confluens* (Branson & Mehl), x60, from Upper Silurian Yarrangobilly Limestone, S.E. New South Wales. 3, Pa element of *Ozarkodina* sp. cf. *O. johnsoni* (Klapper), x60, from Lower Devonian Lilydale Limestone.

vances reveal that Palaeozoic rocks also contain other mysterious microfossils like chitinozoans, scolecodonts and acritarchs, which also have potential in dating Palaeozoic rocks.

Nevertheless continuing research into conodonts is revealing new uses for these remarkable fossils. They can now be used by their colour as an index to the metamorphism or the degree of alteration of rocks. Recognisable collections have now been extracted from high grade metamorphic rocks and from cherts where no other fossils are known. The pace of study into the group continues to quicken with no end in sight.

In Australia

Conodonts were first recorded in Australia by Crespin (1943) who described a small collection from Ordovician strata in the Waterhouse Range of Central Australia.

Throughout the 1950s and early 1960s, the occurrence of conodonts from Palaeozoic strata in Queensland, Western Australia and the Northern Territory was recorded but no detailed study ensued. Early reports generally came from limestone platform sequences where prolific collections could be made. Since 1965, conodonts have been recorded from rocks in every state of the Commonwealth. Detailed investigations of collections from western Queensland (Cambro-Ordovician), Yass-Canberra area (Silurian) and northern Western Australia (Late Devonian) provide valuable reference sections for the world wide correlation of strata.

However, much work remains to be done before Australian conodontophorids are well known.

Victorian Problems

Victoria contains thick sections of Or-

dovician, Silurian and Devonian marine deposits and conodonts have been recorded from rocks of each system. Kennedy (1972) found Ordovician conodonts in the Digger Island Limestone at Waratah Bay. Bischoff in Talent, Berry and Boucot (1973) records Silurian occurrences in remote limestone deposits near Benambra and near the source of the Murray in eastern Victoria. However, limestones are rare in Victorian Ordovician and Silurian rocks and no palaeontologist has yet been encouraged to search for conodonts in the thick shale, siltstone and sandstone successions where most primary organic material has been much altered or removed.

The study of conodonts from the Early Devonian rocks in Victoria has led to a refinement of age assignment of these rocks. Most of this work has been carried out by G. M. Philip and his colleagues, at the University of New England during the 1960s. They sampled most Devonian limestones in South-eastern Australia and worked on the corals and conodonts. Their studies revealed good conodonts in the limestones at Buchan which clearly indicated an Early Devonian age for this succession for the first time.

Early Devonian limestones at Lilydale, Waratah Bay, Tyers near Moe, Loyola near Mansfield and others have also yielded conodonts. Refined age determinations and confident correlation overseas were thus obtained for these deposits.

Of course our work on Victorian conodonts is still incomplete and several productive sections are, as yet, incompletely documented.

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Field Naturalists in Norfolk Island

13-23 October, two members of F.N.C. Melbourne Branch, were on Norfolk Island. They were particularly interested in the geology, flora and birds of the Island. Contact was made with Mr Owen Evans, Vice President of the Fauna and Flora Society, who gave them an evening in his home of interesting Kodachromes, showing Norfolk Island, and the off-shore islands of Nepean and Philip. Some birds seen were: Red-haired Tropic birds, excellent observations occurring at Cascade Bay, where these birds appeared to be deciding on cliff nesting sites; White Terns arriving from the Philippines to breed in Norfolk Pines; Masked Gannets sitting on nests; Emerald Doves; Crimson Rosellas; Scarlet Robins; Sacred Kingfishers; White-capped Noddy Terns; 3 different migrant Waders. Local naturalists watched from cliffs at night, for the first arrivals of Wedge-tailed Shearwaters. Lesley Bennett and Mary Doery were with members of a group of 35 National Trust of Australia (Victoria) Tour. Mr Evans sent greetings to our club from the Fauna and Flora Society of Norfolk Island.

Mary K. Doery

FNCV Excursion to S.W. Victoria

1-7 October, 1977

By Mary K. Doery

1-7 October, 17 members made Casterton a base for investigating the surrounding country.

We should like to thank Mrs Todd who lives in the Wilkin area south of Casterton, for acting as our guide to the heathlands of Wilkin Park, and Mill Swamp.

Mrs Kathleen Meehan, a member of our party, knew the area well, and we were grateful to her for giving us good suggestions for some excursions, and historical facts along the way. Mrs Meehan was our guide to the Dergholm area, Baileys Rocks, and the "Big Tree", which is an old Red Gum near Chetwynd.

We visited the heathlands of part of the Kentbruck National Park, the Ink Pot, and Richmond National Park overlooking Discovery Bay, and where there is the Learmouth Memorial Nature Trail. At Mount Gambier, the cutting of limestone was in progress at a quarry, and the Blue Lake was visited. At the former Railway Station rooms, Casterton Museum is housed and we found it a worthwhile place to see.

Miss Marie Allender was given directions from Mrs Daphne Boyle, one of our members who lives in the area, to Cemetery Swamp and Lake Mundi, just off the Penola road. Both places proved most rewarding.

Mr Frank Robbins, a member of the Bendigo FNC was with us, and he provided detailed geological maps of SW Victoria which were helpful. We enjoyed an evening of Rodachromes which Mr Robbins took on a recent tour of India to attend a World Conference on Glaciers.

Flora

The time was especially rewarding for orchids in flower. Wax-lip Orchids *glossodia major*, showed all shades from white to deep mauve. Pink Fingers *Caladenia carnea*, showed white through to deep pink, and a sweet musk-like fragrance was noticed from these flowers. Two species of Spider Orchids, *Caladenia patersonii*, and *C. dilata* were found. Perhaps thousands of leaves of Red-beaks *Lyperanthus nigricans* were examined, but only one inflorescence was discovered. Species representing the following genera were seen, Pterostylis, Acianthus, Diurus, Thelymitra, and Calochilus.

Lavender Grevillea *G. lavandulacea*, was covered in bright red flowers, and in this Proteaceae there were two species of Banksias in flower, Desert Banksia *B. ornata*, and Silver Banksia *B. marginata*. Common Fringe myrtle *Calytrix tetragona*, was at its peak for blossom. Of the Papilionaceae, several genera were observed, and Running Postman *Kennedia prostrata*, showed markedly large pea flowers.

Epacrids were well represented, and of special mention were several plants of Golden Heath *Styphelia adscendens*, covered with greenish yellow bells. Blunt Everlastings *Helichysum obtusifolium*, with their white inflorescences were often seen. Of the Violaceae, the Shrub Violet *Hybanthus floribundus*, Tiny Violet *Viola Sieberiana*, and Ivy-leaf *V. hederacea* were flowering.

Four species of Sundews were found; Scented *Drosera whittakeri*, which was in fruit; Tiny *D. pygmaea*, in bud; Climbing *D. planchonii*, and Tall *D. auriculata*, both of which were in flower. There were three species of Boronia flowering, the very beautiful Blue *B. caerulescens*, and the pink flowering Small *B. nana*, and Hairy *B. pilosa*. One large shrublet of Blue Tinsellily *Calectasia cyanea*, was found. Other representatives of Liliaceae, were; Blue stars *Chamaescilla corymbosa*, Twining

Fringe-lily *Thysanotus patersonii;* Dwarf Wire-lily *Laxmannia sessiliflora;* Early Nancy *Anguillaria dioica;* Milkmaids *Burchardia umbellata*. Spikes of Grass-tree *Xanthorrhoea* sp., were conspicuous in certain areas.

Birds

Each day Bird Lists were taken at approximately ten minute intervals of travelling time. These lists are now recorded for the Field Atlas of Australian Birds. It could be mentioned that several groups of Brolgas were sighted, and it was wonderful to watch parents with two young, at a place within almost two miles of Casterton. Some keen bird observers were up at dawn looking for birds in the Casterton Sewerage Works area, and in low lying swampy parks of the Glenelg River near the town. On several occasions Emus were seen, and also, pairs of Mountain Duck with up to nine young. Masked Plovers and their young were often on the verge near roads.

On one day, Mr Ian Morrision taped the song of Eastern Shrike Tits, which were inhabiting eucalypts, in the vicinity of the Sports Ground. Then, in the same place at another time, our group assembled to hear a replay, and watch and listen to the fascinating behaviour of the Shrike Tits to their own song. At Baileys Rocks some of us observed a male and female Brown Tree Creeper feeding their young in a nest which was built in the hollow of a eucalypt. State Game Reserves of permanent water in addition to many stretches of temporary water made possible sightings of numerous water birds. Miss Cecily Allen has compiled a list of 88 species of birds seen, and the list is included at the end of this report.

We should like to thank Miss Marie Allender for arranging this Spring Excursion, and I am sure some of us will want to re-visit these interesting parts of our State.

Birds recorded on FNCV week in Casterton area
1-7 October 1977

*breeding species-

Emu
Little Grebe
Little Pied Cormorant
Black Cormorant
Little Black Cormorant
White-necked Heron
White-faced Heron
Cattle Egret
Large Egret
White Ibis
Straw-necked Ibis
Yellow-billed Spoonbill
Black Swan
Mountain Duck
Black Duck
Wood Duck
Musk Duck
Black-shouldered Kite
Whistling Kite
Swamp Harrier
Brown Falcon
Dusky Moorhen
Swamphen
Coot
*Brolga
*Masked Plover
Black-fronted Dotterel
Pied Stilt
Silver Gull
Yellow-tailed Black Cockatoo
Gang Gang Cockatoo
Galah
Long-billed Corella
Sulphur-crested Cockatoo
Crimson Rosella
Red-rumped Parrot
Fan-tailed Cuckoo
Pallid Cuckoo
Rufous-tailed Bronze Cuckoo
Tawny Frogmouth
(dead on roadside)
Kookaburra
Sacred Kingfisher
*Welcome Swallow
Tree Martin
Fairy Martin
Pipit
Black-faced Cuckoo-Shrike
Blackbird
Scarlet Robin
Yellow Robin
Shrike-tit
Golden Whistler
Rufous Whistler
Grey Shrikethrush
Jacky Winter
Restless Flycatcher
Grey Fantail
*Willie Wagtail
Reed Warbler
Little Grassbird
Rufous Longlark
Supurb Bluewren
Brown Thornbill
Striated Thornbill
Varied Sitella
White-throated Treecreeper
*Brown Treecreeper
Red Wattlebird
*Noisy Minor
Yellow-faced Honeyeater
White-eared Honeyeater
White-plumed Honeyeater
Black-chinned Honeyeater
New Holland Honeyeater
Eastern Spinibill
Spotted Pardalote
*Striated Pardalote
Goldfinch
House Sparrow
Red-browed Firetail Finch
Common Starling
White-winged Chough
Magpie Lark
Masked Woodswallow
White-browed Woodswallow
Dusky Woodswallow
Australian Magpie
Raven sp.

By their skins ye shall know them

BY M.R.O.MILLETT*

This article was first published in "The Commonwealth Professional" June 1977.

Australia's unique race of trees, the eucalypts, cannot fail to hold the interest of people who do not merely take them for granted. The stomata, minute elliptical pores which occur in the epidermis, or 'skin', of the leaves of the trees (as indeed, is also the case with all other terrestrial green plants) are much more important than is commonly realised.

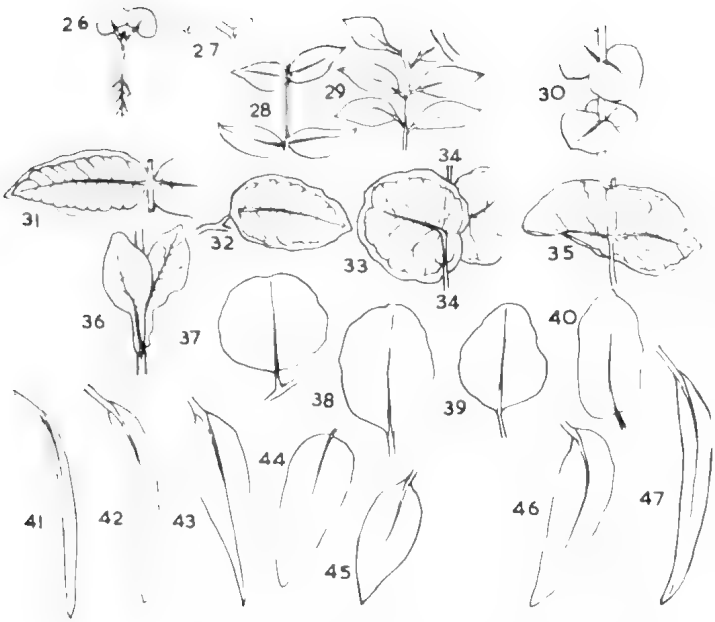
The purpose of this article is not to present the implications of the foregoing in the usual manner of a scientific paper, justified by detailed data and analysis. Rather is it to interest the general reader, and also to place on record, in outline, what the writer believes is a worthwhile hypothesis, in the hope that some day others, with more years ahead of them, will investigate the possibilities suggested. This would require observations and experiments to test the validity of a supplementary approach to botanical classification and comparative anatomy, but at a cellular level. Research along these lines could not only be full of interest to botanists, plant breeders and others, but could also be of significance in the better understanding and growing of many kinds of plants — be they in pastures, agricultural crops, forest crops, or just trees, shrubs and other plants cultivated only for aesthetic reasons.

First published drawing, for a scientific description, of *Eucalyptus obliqua* in 1788. Drawing by noted French botanical artist, L. J. Redouté, for the botanist, Charles-Louis L'Héritier de Brutelle (1746-1800), who named the genus. (Ref. 1.)

Eucalyptus Species

First, a few words in general about Australia's genus *Eucalyptus* which is indigenous only to Australia, Papua-New Guinea, Timor, the Celebes and the Philippines. Only a very few (tropical) species are endemic outside Australia itself and these are confined to the listed countries to the north of Australia. Depending on the system of classification used, there are considered to be from 400 to 600 species of this remarkable group of trees. "Australia and the world have in the eucalypt a natural asset capable of further development and use in ways seldom adequately envisaged, let alone attempted, up to the present. We have barely scratched the surface of the problems, and the possibilities of exploiting the potentialities of our eucalypts in terms of better land use, increasing the economic resources and deriving greater benefits for mankind are immense . . . these trees grow over a wide range of climatic environments — from the mild coastal regions to the cold alpine tree line, and from the rain forests of the tropics and temperate winter rainfall

*72 Nicol Road, Tecoma, Victoria.



26. Cotyledons of germinating seed with some other shapes (27).
28. Opposite leaves of seedling followed later by leaves placed alternately up the stem (29).
30-36. Various ways the leaves arise from the stem.
37-47. Various leaf shapes.

Some of the many specific variations in leaf shape amongst eucalypts. (Ref. 1.)

areas to the hot dry interior and margins of the desert."[1]

Because of the wide range of diverse environments, where different species of eucalypts are adapted each to grow in its own favorable native environment, these trees of many species are admirably suited for cultivation in other countries — for there is a suitable type of eucalypt for selection to grow in almost any situation where a tree will grow. Altogether, eucalypts are known to have been introduced successfully to more than 40 countries.

Stomata

The discovery of the minute organs in the leaf, later known as stomata (plural for stoma), and speculation and experiment with regard to their function, awaited the discovery of the microscope. For the first published account of stomata, credit must be given to Malpighi (1672), who in his "Anatomia Plantarum" describes these organs and gives some rather crude drawings of them as seen in the leaves of the oleander.

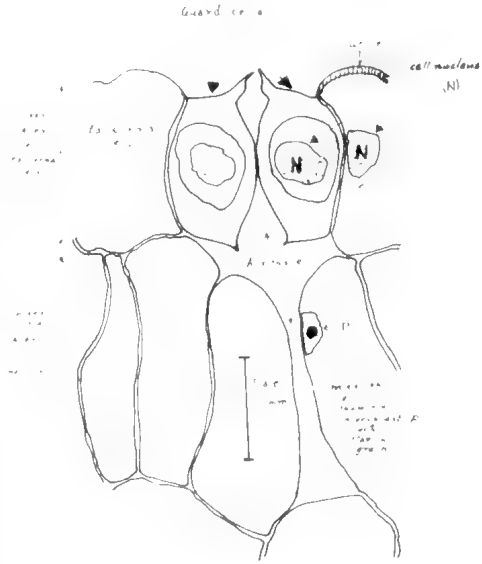


Diagram of transverse section through leaf of *Eucalytus erythrocorys*, showing the two guard cells forming the stoma in a closed phase. Microscope at 2,750X, but scale on photo itself indicated by line of 1/100 mm on drawing. (Based on photo by D. J. and S. G. M. Carr in Ref. 2.)

In the same year an Englishman, Nehemiah Grew, in his "Anatomy of Vegetables Begun", describes in plants "orifices or passports either for the better avolation of superfluous sap or the admission of aer."

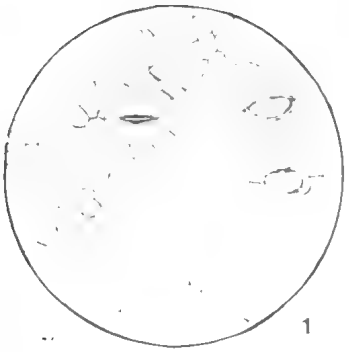
The appearance and shape of the stomata are shown in the accompanying photomicrographs and other illustrations. "A stoma is a pore formed by two specialized cells in the epidermis of plants. Stomata are present in large numbers, mainly in the leaves, and through them gaseous exchange with the atmosphere takes place. Each stoma is surrounded by two guard cells which are roughly crescent- or sausage-shaped. The guard-cells change their shape sufficiently, due to variations in starch content and pressure of fluid within them, to enlarge or diminish the size of the pore from a completely closed condition to one of maximum opening. The word stoma is also commonly applied to a pore and the guard cells surrounding it. The word stomate(s) is often applied to convey this latter meaning . . . vast quantities of water vapour are . . . released from the soil's subsurface to the atmosphere by the Earth's vegetation, and this is part of the hydrological cycle providing water to sustain life on our planet. Plants use the atmosphere's carbon dioxide (CO_2) in the respiratory process necessary for their development and growth. The carbon (C) of the CO_2 is retained by the plant to combine with hydrogen (H) and oxygen (O) in various forms. Some of the oxygen, derived from the original intake of the H_2O and CO_2, is released to the atmosphere, thus contributing to the maintenance of the required four-fifths oxygen content of the air breathed by Man and other animals."[2] Thus plants are, so to say, the "lungs" of our biosphere.

Transpiration, or the amount of water emitted in vaporous form through the stomata of plants, is not easy to measure accurately, except where the plant is growing in the restricted and unnatural environment of a container which can be weighed for measurable water loss. It is estimated that plants growing in the temperate zone may transpire up to ½ litre per square metre of leaf area per hour, that is to say, about .08 pint per square foot per hour, or about ¾ pint over a period of 10 hours of daylight. Certainly, the amount of water drawn up by the roots of a large tree and transpired through its foliage can be an immense quantity. It has been said that the aggregate area of the fully open pores, as a proportion of the total leaf area, is only 1 to 3 per cent; but even this estimate seems far too high. The fact that rates of stomatal transpiration are frequently 50 per cent (and sometimes more) of the evaporation from a free water surface, under similar conditions, is doubtless capable of explanation in terms of rates of gaseous diffusion in relation to aperture size; diffusion rate through apertures of smaller area tend to result in faster rates (relative to pore area) than through apertures of larger area.

I first became interested in the stomata of Eucalyptus species not long before World War II, when, using an optical microscope at 250 X magnification, I made large numbers of stomatal counts on the leaf surface (or epidermis), and also measurements of the size of the stomatal pore, as well as of the guard cells which together surround and form the pore.[3] The size of the ellipse formed by the two guard cells is more significant than that of the pore, since the former's long axis varies little; whereas the pore itself varies considerably in size as it opens or closes in response to climatic and physiological changes throughout the day.

Stomata size and frequency

The microscopic work was commenced to determine whether there was any difference in stomatal frequency and stomatal size in the leaves of Spotted Gum *Eucalyptus maculata* growing in certain parts of Victoria, New South Wales and Queensland. This was done because there were certain features of the macroscopic botanical characters (leaves, buds, flowers, fruits, bark, etc.) which differed in trees considered to be of the same species, but indigenous to quite different localities many hundreds of miles apart. The stomata in their leaves were examined under the microscope



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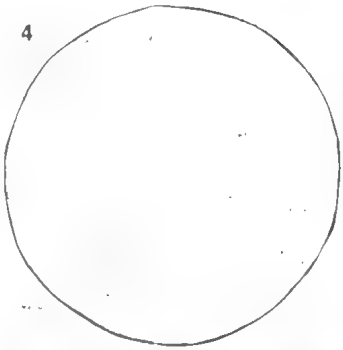

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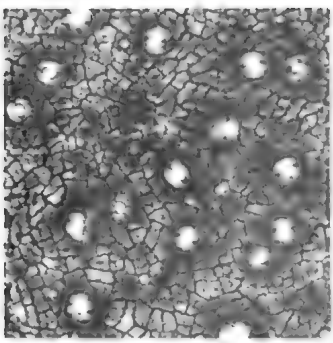
Stomata and epidermal cells, with microscope mainly at 250X. 1-4, drawn with camera lucida to show range of sizes:

1. *E. maideni*;
2. *E. delegatensis*;
3. *E. cypellocarpa*;
4. *E. grandifolia*.

5-13, photomicrographs:



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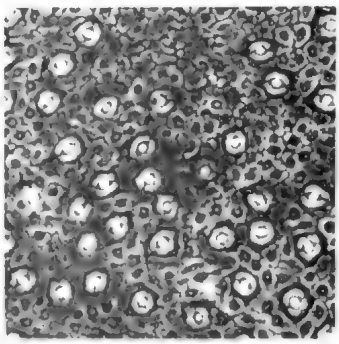

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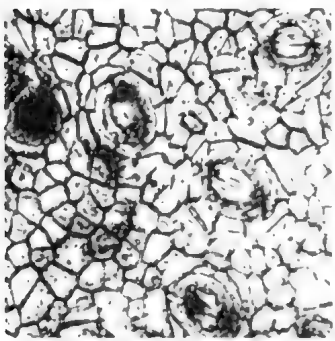
5. *E. maculata* (N.S.W.);
6. *E. maculata* (Q);
7. *E. maideni*;
8. *E. diversicolor* (upper leaf surface has no stomata);



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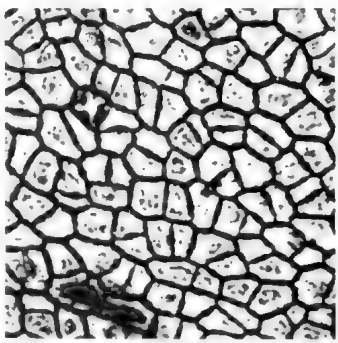

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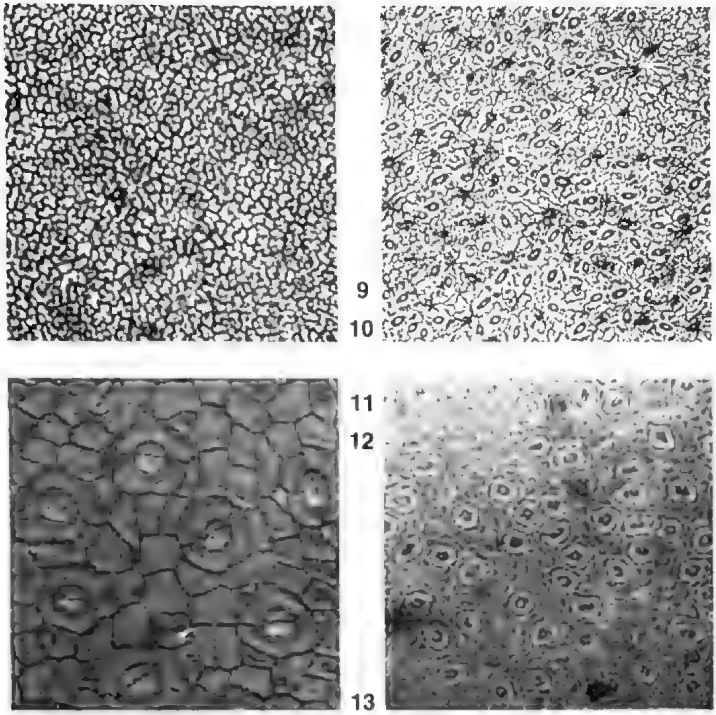
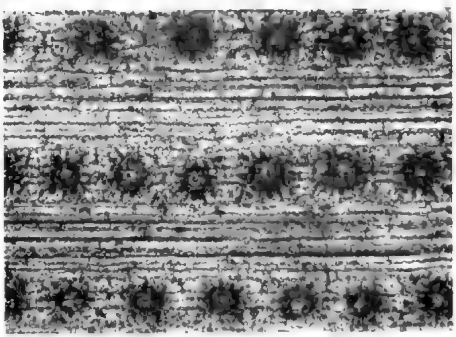


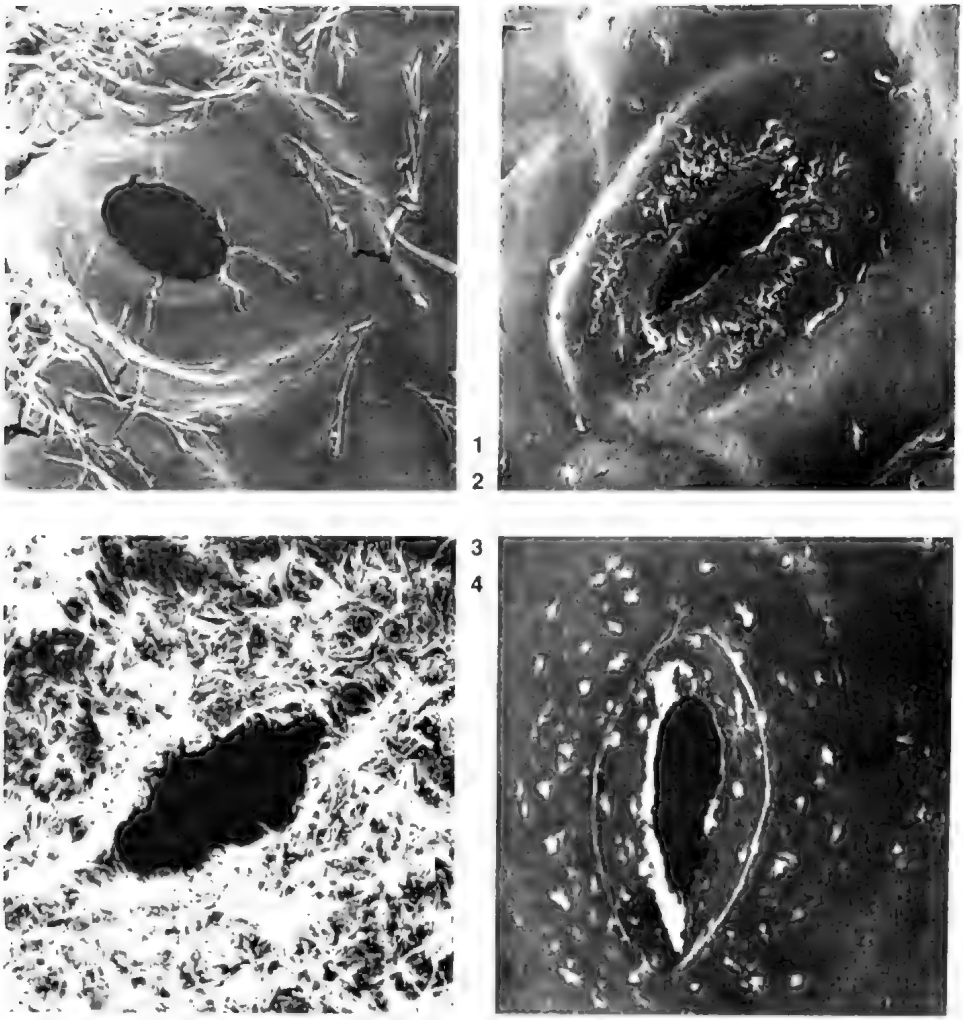
9. *Tristania laurina* (upper surface has no stomata);
10. *Tristania laurina* (lower surface only has stomata);
11. *E. delegatensis;*
12. *E. spenceriana;*
13. *Pinus radiata* (stomata always in lines along pine needle). (Photographic scales not given here.)

and it was found that there was a significant difference in their number, and even size, as between the localities of the trees concerned. This helped to confirm the findings of some forest botanists who had noticed the macroscopic differences. Although this did not necessarily justify the naming of new species, it did at least show that small subspecific differences are probably more basic than commonly believed. There is a discernible fascinating diversity amongst our eucalypts due to possible causes such as natural hybridization, geographical differences and other suggested reasons.

The investigation of one species led to curiosity about the remaining several hundreds of different Eucalyptus species. Could it be that the epidermis of these would tell a meaningful story in terms of genetic and environmental differences? It soon became evident that there were some considerably significant differences in the epidermis as between some species — especially, for example, in relation to species growing in regions of very low rainfall as compared with tropical and temperate rain-forest



species. It looked like an exceedingly promising and perhaps, indeed, exciting project if it could be carried through. But various other demands required that it be indefinitely set aside. Some years after my first thoughts on this problem, it was most interesting and a pleasant surprise to find that the Victorian botanist, Baron Ferdinand von Mueller, in a seldom-referred-to series of monographs published nearly a century ago, had at one time been interested in the stomata of the genus. He had also speculated on their possible use in better understanding and even identifying eucalypts.[4]



Photomicrographs, with the electron microscope, of leaf surface of four Eucalyptus species, showing an open stomatal pore and the epidermal surface's wax formation which varies from species to species. Approximate photographic scale of magnification varies from about 2,000X to 3,000X. 1 *E. muellerana*; 2 *E. fastigata*; 3 *E. panda* ssp *panda*; 4 *E. obliqua*. Photographs from T. C. Chambers and N. D. Hallam

This helped to confirm what I believed to be the worth-whileness of persuading botanists to pursue this matter further.

Work in Australia

Although this field has not engaged much attention in Australia until more recent years, most of the known interest in the epidermis of Eucalyptus has been shown at the School of Biological Sciences, Australian National University, under Professor D. J. Carr and Mrs. S. G. M. Carr[5]; and at the School of Botany, University of Melbourne under Professor T. C. Chambers. Here the particular interest in the epidermis has been mainly in differences in the detailed sculpturing of the cuticular layer and the protective waxes. The high resolving power of the electron mioscope (non-existent in my day) is able to show these sculpturings like a fascinating "moonscape."! Dr. Neil Hallam, now of

the Department of Botany, Monash University, made the epidermal leaf waxes the subject of his PhD thesis[6] at the University of Melbourne, and co-author of a paper.[7]

Significance of the Leaf

Basic to the concept of the significance of the epidermis should be a still wider botanical "credo" that the fundamental organ of green plants, the leaf, and detailed knowledge of its anatomy and physiology, should be central to botanical science.

It is an indisputable fact that Linnaeus' system of plant classification has been of great benefit in readily recognising and recording certain macroscopic differences between plants, and in naming species and classifying them in a pragmatic fashion, with the least possible disagreement between taxonomic botanists. It does at least enable botanists to use the same names and talk the same language, at least eliminating much possible confusion in that area. This system is an "artificial" system, as opposed to a "natural" system, using as it does characters such as the flowers, the fruits, the seeds, leaf shape, etc. A "natural" system, say basing classification on differences in internal anatomy and related physiological function, would doubtless be more truly "scientific", but it would, by its need for immensely complicated comparative studies of disputable "basics", result in endless arguments. The Linnean system established about 1737, is here to stay, if for no other reason than its eminent pragmatism and long establishment. It is most unlikely to be supplanted by a natural system, just as English is unlikely to be replaced by Esperanto.

I am not, of course, advocating that the comparative anatomy revealed by the microscope should be used as a practical day-to-day method of classification. In this connection, however, it could often be used profitably in sorting out many differences between botanists whenever the more superficial Linnean system seems to lead to contradictions. More important is my contention that the leaf, and particularly its surface, should be the subject of far deeper study, than up to now, throughout the Vegetable Kingdom. Two wonderful new tools of science, the electronic computer and the electron microscope, now bring us nearer to the achievement of obtaining and assembling new knowledge in a way previously not dreamt of. We need to consider the great variety of leaf surfaces throughout the plant world.

Just consider the leaf surface, to which the plant owes so much for its development, growth and survival, and what it presents in variety and ingenuity, and aesthetic attraction, even only to the naked eye, and a pocket hand lens. How much more so under the microscope! Consider alone the form and function of those cellular outgrowths from the epidermis, called hairs: soft and scattered hairs; fine and close; coarse, rough, bristly, cottony felt; woolly and glandular; ridged and wrinkled; flattening down; unbranched; starlike; straight or curved prickles; sticky secreting hairs . . . These and other features (so often affecting air flow at the leaf-surface, and therefore associated with transpiration in conjunction with the stomata) also open up a field of study, especially in understanding the physiology of plants.

The foregoing is offered tentatively as the result initially of intuitive thinking, and needs much more testing by empirical procedures. I am convinced, however, that botanical science should ultimately follow this path, and will be able to do so.

Acknowledgements

I wish to thank Professor T. C. Chambers and Dr. Neil Hallam for permission to reproduce their excellent photomicrographs of much-magnified stomata and wax coverings in the eucalypt's epidermis. My own photomicrographs, made with the conventional microscope, have their limitations, but serve a little to illustrate the subject. I do want to record here my debt to my old friend, whose assistant I was, and who first asked me to count the stomata of *Eucalyptus maculata*, thus arousing my interest — Charles Edward Lane Poole (1885-1970), Ingénieur Civile des Eaux et des Forêts

(Nancy), Australia's first Inspector-General of Forests (1927-1944).

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Microscopes are for Everybody

Come to a series of one-hour talks and demonstrations

Microscopy opens up a world of beauty and wonder that can be enjoyed by everybody yet is sadly missed by many. Here is a chance for you to share that enjoyment. And if you wish to develop your skill in the use of microscopes to further your studies, there are specialists at these evenings to help you overcome problems.

The FNCV Microscopy Group consists of enthusiasts who enjoy microscopy as a hobby for its own sake as well as a means for studying natural history. Members have decided to give a series of talks and demonstrations at the Group's monthly meetings during 1978. They aim to help people understand the variety of microscopes that are available, how they work, the type most suited to any particular purpose or person, how to get the best results, how to prepare objects for examination under a microscope, etc. The series aims to cover all aspects of the use of microscopes as a form of recreation or study for people of all ages.

Talks and demonstrations will be on the third Wednesday of each month at the National Herbarium hall. The meeting starts at 8.00 p.m., the address at 8.15 and continues with demonstrations for one hour. The atmosphere is informal and there will be plenty of time to ask questions and to examine more closely the demonstration items and members' exhibits. And Group members are ready to help you with any microscopy problem; there's an enthusiastic specialist on almost every aspect.

Here is the programme for 1978:

February 15. Exhibits by Group members and discussion of the year's programme.

March 15. Microscopes — historical and modern. Demonstration of all types from the simplest to the most advanced. How to choose a microscope. ¼-hour for members' exhibits.

April 19. The various methods of illuminating an object to see the most detail — top lighting, bright field, dark ground, Rheinberg illumination. ¼-hour for members' exhibits.

May 17. Simple methods of mounting dry objects for microscope examination — insect parts, butterfly wings, mineral sands, seeds, forams, textiles, small shells, etc. ¼-hour members' exhibits.

June 21. How to prepare and mount objects in Canada balsam, glycerine jelly, Euparal and other mountants. ¼-hour members' exhibits.

July 19. Pond and marine microscopic life — collection, treatment, method of viewing, preservation. ¼-hour members' exhibits.

August 16. Zoological and botanical section cutting, staining, mounting. ¼-hour members' exhibits.

September 20. Special forms of transmitted light. Demonstration of Köhler illumination, phase contrast, polarised light for biological specimens and interference. ¼-hour members' exhibits.

October 18. Photography through the microscope — black and white, colour, movies. ½-hour members' 35mm colour slides.

The Microscopy Group hopes the talks will help people to become more interested in this fascinating hobby. Everybody is invited to attend. There is no fee.

For further information contact The Secretary, Microscopy Group, c/o FNCV, National Herbarium, South Yarra, 3141, or any other member of the Group.

Comparison of the English and Victorian Terrains

BY EDMUND D.GILL,*

A few months ago it was my privilege to travel once more England's "green and pleasant land" from East Anglia as far west as Somerset and Devon, from Portland Bill in the south to Durham in the north, and coastal Whitby where Captain Cook lived. Boarding a boat at Potter Heigham, we explored the northeast sector of the Norfolk Broads, sailing up Meadow Dyke to Horsey Mere near the coast. From there we walked past the reconstructed windmill to the village of Horsey (with its ancient church) and by pathway across the fields to the sea. In February 1938 a storm surge breached the sea wall, flooding most of the Parish of Horsey; it took four and a half months of constant pumping to remove the sea water. This event seemed far away as we walked the rich fields with their sheep, cattle and crops. As I walked across those pleasant fields, I set to wondering why it is that the English terrain is so different from that in Victoria, Australia. England has an area of about 51,000 square miles, while that of Victoria is about 88,000, so these antipodal territories are roughly comparable in extent. Apart from the flora and fauna, what are the essential differences between these two interesting terrains?

I decided that they are five:

1. **English Humidity.** It was midsummer but we had seen little sun. The drizzle had stopped, but the skies were grey, the air humid, and evaporation low. The rain does not fall in heavy showers as it does in Victoria, but mostly as a drizzle that does not cause much erosion. The Royal Society of Victoria had trouble with the Hall roof because this 1859 building was designed for English drizzle and not Victorian "cloudbursts". The light green of the English countryside is a function of high effective rainfall, and the spread of precipitation over most of the year. By contrast, in summer in Victoria there are periods when rain is rare, and a hot sun shines down from a clear sky, turning the vegetation brown.

2. **Legacy of Glaciers.** Nearly the whole of England is covered with Ice Age deposits. Great glaciers crept down from the north, leaving a carpet of till over the terrain. South of the ice cap rim other processes were at work such as ice wedging, frost shattering and solifluction. Thus most of England is covered by very young sediments, whereas in Victoria ancient rocks outcrop over much of the terrain; there are no Pleistocene tills.

It is interesting to note that in England what happened 100,000,000 years ago is presently affecting much of the countryside. In the Cretaceous (when dinosaurs were still about) a warm sea covered part of Western Europe and precipitated the Chalk that now forms white cliffs and rolling downs. Masses of siliceous sponge spicules in the chalk later became flint. The glaciers gouged the soft chalk forming chalky till, and thus over a very wide area distributed the very resistant flints. Early man utilized these flints for tools, while in the Middle Ages (for example) they were used for building roads (as at Elm Hill, Norwich), abbeys (as at Bury St. Edmunds) and houses (as at Thetford). There is no such chalk in Victoria, but on the South Australian border there is a Miocene limestone with flints. The Aborigines used it, and traded it to central and northern Victoria, whereas in the Murray Valley north of Victoria a common opal was utilized.

3. **Youthful Soils.** In England glaciers, like giant bulldozers, scraped away the old

*47 Wattle Valley Road, Canterbury

Robin Hood's Bay, Yorkshire. The bedrock is Mesozoic black shale, over which is a thick boulder clay of Ice Age origin. Slipping in the clay has broken the road in the foreground and threatened the Medieval village below, necessitating the construction of a high sea wall.

E.D.G. photo.

soils. Young soils have now developed on the tills and other Ice Age deposits. By contrast, many Victorian soils are very ancient, and some (such as laterites and krasnozems) were formed in the Tertiary Era two to five million years ago. The young soils are much richer because less leached. As a result, they grow a better vegetative cover. In England, the combination of youthful soils and humid climate results in the "green and pleasant" look we so much enjoy.

4. **Pebbly Shores.** The word **beach** appears to come from the Middle English **bayche,** which means a pebbly shore. Shakespeare certainly used **beach** in that sense. On Horsey Beach the sand was pebbly. The Pleistocene glaciers tip-spread the terrain with rocks, especially flints. The sea sieved out this till, carrying away the fine sediments and emplacing the sand and pebbles on the beach. On Horsey Beach flints dominated, but there were also samples of rocks from a wide range of other formations. One interesting relic was a rounded clod of peat held together with humified roots. Buried in the peat was a piece of flint. I wonder what human story is represented by that flake? The energy level of a bog is too low to transport such a piece of flint so it must have been carried there by man. Probably the peat came from under the sea, from a bog that formed after the ice retreated but before the sea rose to its present level; such peats are frequently found round the world. It would have been interesting to use radiocarbon to date the peat, and the roots to show when the shrub or young trees grew there. Pollen analysis could have defined the flora of the area, fibres from the peat proved what kind of bog it was, while the wood structure of the roots could have shown what kind of bush grew on the peat, and whether it belonged to the same ecology as the bog or was a later phase.

In England there are many beaches that consist almost entirely of flint pebbles like the famous Chesil Beach at Portland. At Crumini in Brittany there is such a beach which our French friends considered a "belle plage", but I fancy I can still feel the

dents of those hard flint pebbles! A "beautiful beach" in Victoria means a wide sandy one.

5. **Marine Energy and Tidal Range.** The waves were small at Horsey Beach. In Victoria strong waves run on open ocean beaches for most of the year because of the powerful southwest swell from the Southern Ocean. In England there are heavy Atlantic storms, but in the intervals the sea is relatively calm. So there is a very different distribution of marine energy in England from that in Victoria. And at Horsey Beach the tide was coming in fast. In Victoria the tidal range varies from 0.9 to 2.4 m, but in England the tidal ranges are generally high and reach 12.7 m (42 ft.) at Avonmouth on the Bristol Channel. Where the declivity of the shore is low, the intertidal area can be kilometres wide, so that it is easy to get trapped when the tide is racing in. At school I was told the story of King Canute commanding the tide to stand still, and imagined him sitting there for an hour afterwards waiting to see if his command were effective. But I had the wrong ecologic setting. On England's macrotidal shores one can actually **see** the tide advancing, as I did at Flamborough on the east coast. It was a sunny day and crowds of people had gone to the beach to enjoy it. The tide was coming in and every few minutes someone had to shift because the water was rising so fast. By noting a particular pebble, it was easy to watch the advance of the sea in relation to it.

So when the word **beach** is used in England, people think of a pebbly shore with a large tidal range (which creates salt marshes and tidal rips) and seas that are made rough by storms but in between are relatively calm. In Victoria the word **beach** has a connotation of sandy shores with a small tidal range (with rare salt marshes and tidal rips), and a sea that is constantly active because of the strong S.W. swell. In 1973 I showed an international group of scientists over the coast of Western Victoria, and at the end a French professor said, "But Monsieur Gill, where are the peats?" "The absence of peats," I replied, "is one of the marks of the microtidal coast."

So I think that England's "green and pleasant land" is due to the greater humidity of the climate, and the widespread Pleistocene deposits with their youthful soils, while the coasts differ in their coarser sediments, larger tidal range and the different energy profile.

Faggot Case-moth — vandal or opportunist?

Some time ago I helped a friend transplant a large young Spruce tree. We dug it up with a big ball of earth, and as the new position was rather exposed, my friend made the tree secure with several guys of fishing cord.

Next morning, to his surprise, he found that the guy lines had been cut. On close examination he discovered the vandal was the larva of the Faggot Case-moth *Clania tenuis*. It had neatly cut ten pieces of cord one inch long and attached them side by side to the outside of its case. To add to the offence, it was then having breakfast off the Spruce tree!

IAN F. MORRISON, DONCASTER

(To be continued)

Techniques of Research in Ornithology

Preliminary notice of VORG Conference 21-23 July 1978

The Victorian Ornithological Research Group will be holding a conference in Melbourne over the week-end 21-23 July 1978 on the theme "Techniques of Research in Ornithology". All interested persons are invited to attend. Further details will appear in a later issue of this journal.

Bush-peas of Victoria — genus *Pultenaea* — 8

By M. G. Corrick

Pultenaea subumbellata Hooker in Curtis's Bot. Mag. 60: t.3254 (1833).

Pultenaea subumbellata was described by James Hooker from specimens grown in the Glasgow Botanic Garden from seed collected in Tasmania by Dr. Scott. The plant is a very slender, often trailing shrub 30-60 cm high; it will almost always be found in swamps or wet heathland where the slender branches mingle with other vegetation.

The stems are usually glabrous and terete, but in young growth they may be slightly ridged and hairy. The alternate, acute, lancelote leaves are 5-12 mm long and 1-2 mm wide with a blunt tip. They are glabrous, usually flat with margins very slightly incurved. The minute, pale stipules are about .5 mm long, closely appressed to the stem and easily overlooked. They are joined across the base of the petiole and usually remain on the stem when the leaf falls off.

Fig. 9a Known distribution of *P. subumbellata*.

Fig. 9b. Known distribution of *P. paludosa*.

The flowers are about 10 mm long, each subtended by a bract and clustered in small terminal heads. The bracts are broadly ovate, tapering abruptly into a slender but blunt point, which is green and leaf-like below the outer flowers of the inflorescence.

The calyx is about 5 mm long and pubescent or hirsute with rather long hairs, but usually becoming glabrous towards the base. The lower acuminate lobes are longer that the two broad upper lobes. The lancelote bracteoles have ciliate margins, are attached below the calyx tube and are about as long as the tube only. The flowers are orange, the standard has deep purple markings and is about twice as long as broad. The ovary and base of the style are densely covered with long white hairs. The style is hooked and appears thick in comparison with the ovary. Together they are only 3.5 mm long. Flowering time is from mid October to December, but may be earlier, particularly in warm areas. The plump, dark pod is covered with rather long hairs and has usually only one mature seed.

This species is widely distributed over southern Victoria, but the comparatively few collections in the Melbourne Herbarium suggest that it has probably been overlooked in many areas. It also occurs in Tasmania and Southern New South Wales.

SPECIMENS EXAMINED included: Grampians, 12 mls S. of Halls Gap, T.B. Muir 2735, 6.xi. 1962 (MEL 516557); Grampians, E. side of Victoria Range, *A. C. Beauglehole 16139*, 10.xii. 1966 (MEL 516558); Grampians, Victoria Valley, *M. G. Corrick 5659*, 17.x. 1976 (MEL 516563); Nunniong Plateau, *K. C. Rogers*, 29.xi. 1965 (MEL 516870); Bonang Highway-Bendock Rd. Jen., *A. C. Beauglehole 34607*, 19.xi. 1970 (MEL 16871); Dandenong Ranges, *C. Walter*, x. 1900, (MEL 516872).

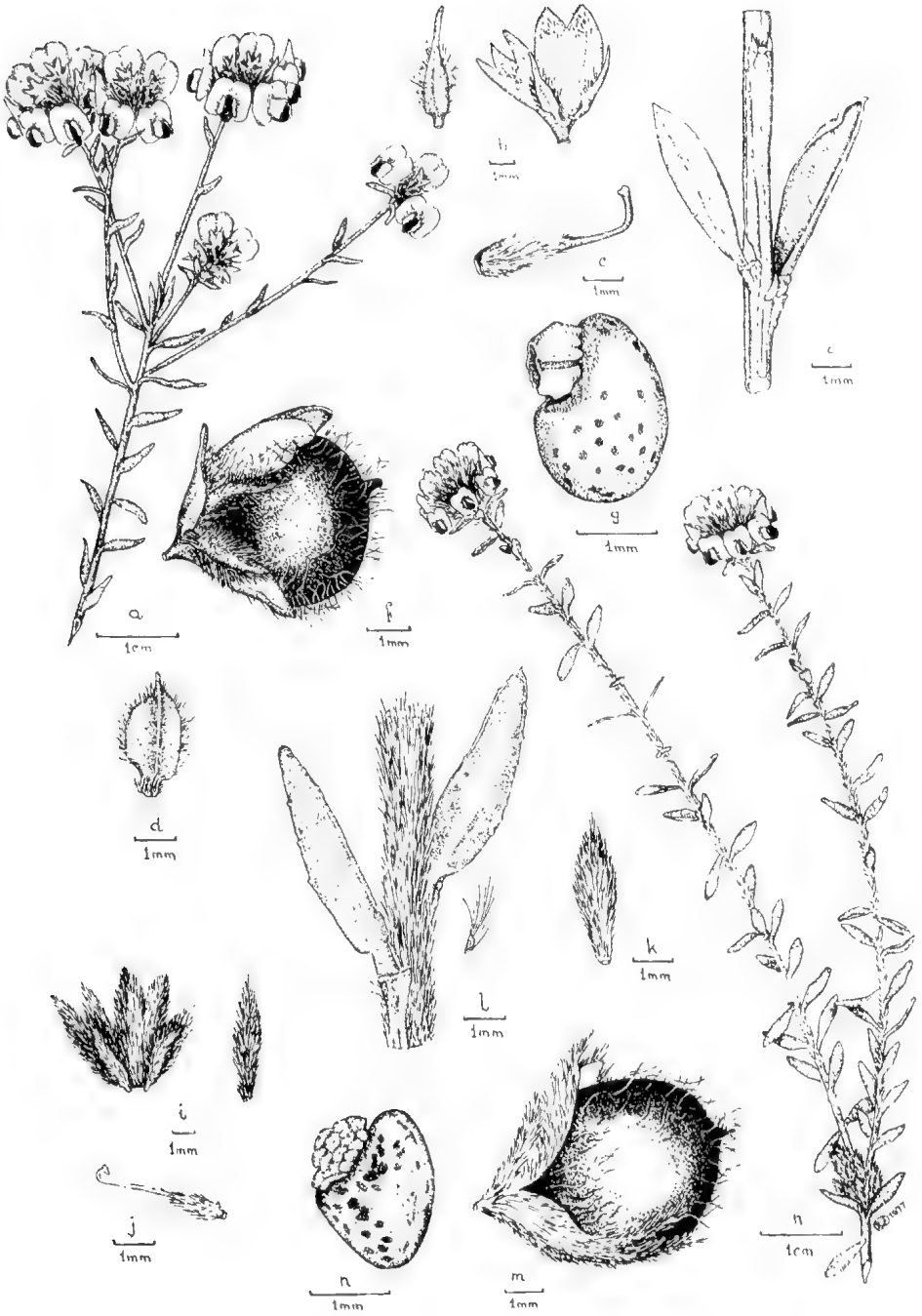

Fig. 9. a-g, *Pultenaea subumbellata*, a, habit; b, calyx and bracteoles, bracteole drawn a little larger; c, style; d, floral bract; e, leaves and stipules, all from MEL 516563; f, pod; g, seed, from MEL 516558. h-m, *Pultenaea paludosa*, h, habit; i, calyx and bracteoles, bracteole drawn a little larger; j, style; k, floral bract; l, leaves and stipules, stipule drawn a little larger, all from MEL 516873; m, pod; n, seed, from MEL 516555.

Pultenaea paludosa J.Thompson in Proc. Linn. Soc. N.S.W. 83:123 (1959).

Pultenaea paludosa was described by Joy Thompson from a specimen collected by Betche in 1833 in swamps between Coogee and Bondi. It is a slender, rather weak shrub from 10-40 cm high, erect when small or later supported by surrounding plants. Superficially it is very similar to *Pultenaea subumbellata* but there are distinctive differences in leaves, stipules, bracts, calyx and bracteoles and the flowers are consistently very much smaller.

The stems are terete and covered with rather long, pale hairs except on the oldest part of the plant. The alternate, ovate leaves are 6-8 mm long, 1-2 mm wide, flat and usually glabrous, but there may be a few long hairs on the upper surface of young leaves. In dried specimens the centre of the underside of the leaf is often dark brown. The mid-rib is not obvious except on the underside of the oldest leaves. The leaf margins are minutely scabrid.

The stipules are very slender, .5 mm long with several fine hairs about 1 mm long at their tips. They are closely appressed to the stem and difficult to see among the stem hairs. Some descriptions and keys state that stipules may be absent in both *P. paludosa* and *P. subumbellata* but, although inconspicuous, they have been found on all the Melbourne Herbarium specimens examined.

The flowers are 6 mm long, each subtended by a small bract and densely clustered at the tips of the branches. The bracts are lancelote and covered with long white hairs; a few of the outermost ones in each flower head may have green tips, but the majority are pale.

The calyx is about 4 mm long, with three lower narrowly acute lobes and two broader, obtuse upper lobes; it is very similar to the calyx of *P. subumbellata* in shape but is densely covered all over with long white hairs. The bracteoles are attached below the tube and are as long as it. They are also covered with long hairs so as to appear to consist almost entirely of a bunch of hairs.

The flowers are about 7 mm long, keel and wings are pale orange with purple streaks. The narrow standard is dark purple edged with pale orange. The ovary and base of style are densely covered with long white hairs reaching more than half-way up the style which is hooked at the tip. Flowering time is between mid September and early October.

The rather hard, rounded pods are 3-4 mm long, dark grey and hairy with one fully developed seed.

This species has only recently been recognised as occurring in Victoria and appears to be confined to East Gippsland. It is also found in coastal areas of New South Wales. In the field the very small flowers, hairy stems and narrow bracts should distinguish it from *P. subumbellata*. It also favours similar wet habitats, but the two species have not been found in the same locality. Many more collections of both species are needed, particularly from eastern Victoria, before their distribution can be clearly established.

SPECIMENS EXAMINED included: Cape Conran Rd., *A. C. Beauglehole 34507*, 12.xi. 1970 (MEL 516555); Prince's Highway 3½ mls. NE of Cabbage Tree Ck., *A. C. Beauglehole & E. W. Finck, ACB 33061*, 4.i. 1970 (MEL 516619); Prince's Highway 25 km W. of Cann River, *M. G. Corrick 5966*, 25.x. 1977 (MEL 516873).

Pultenaea muelleri Bentham in Flora Australiensis 2: 138 (1864).

Pultenaea muelleri is a plant of moist, well-timbered hill-sides and mountain slopes of the central and eastern highlands. It is considered to be endemic in Victoria, but as its distribution extends almost to the border at Mt. Cobberas, Mt. Stradbroke and Mt. Tingaringy it seems likely that it could also occur in south eastern New South Wales. Close to Melbourne it is plentiful in the Kinglake Forest, on Mt. Baw Baw and

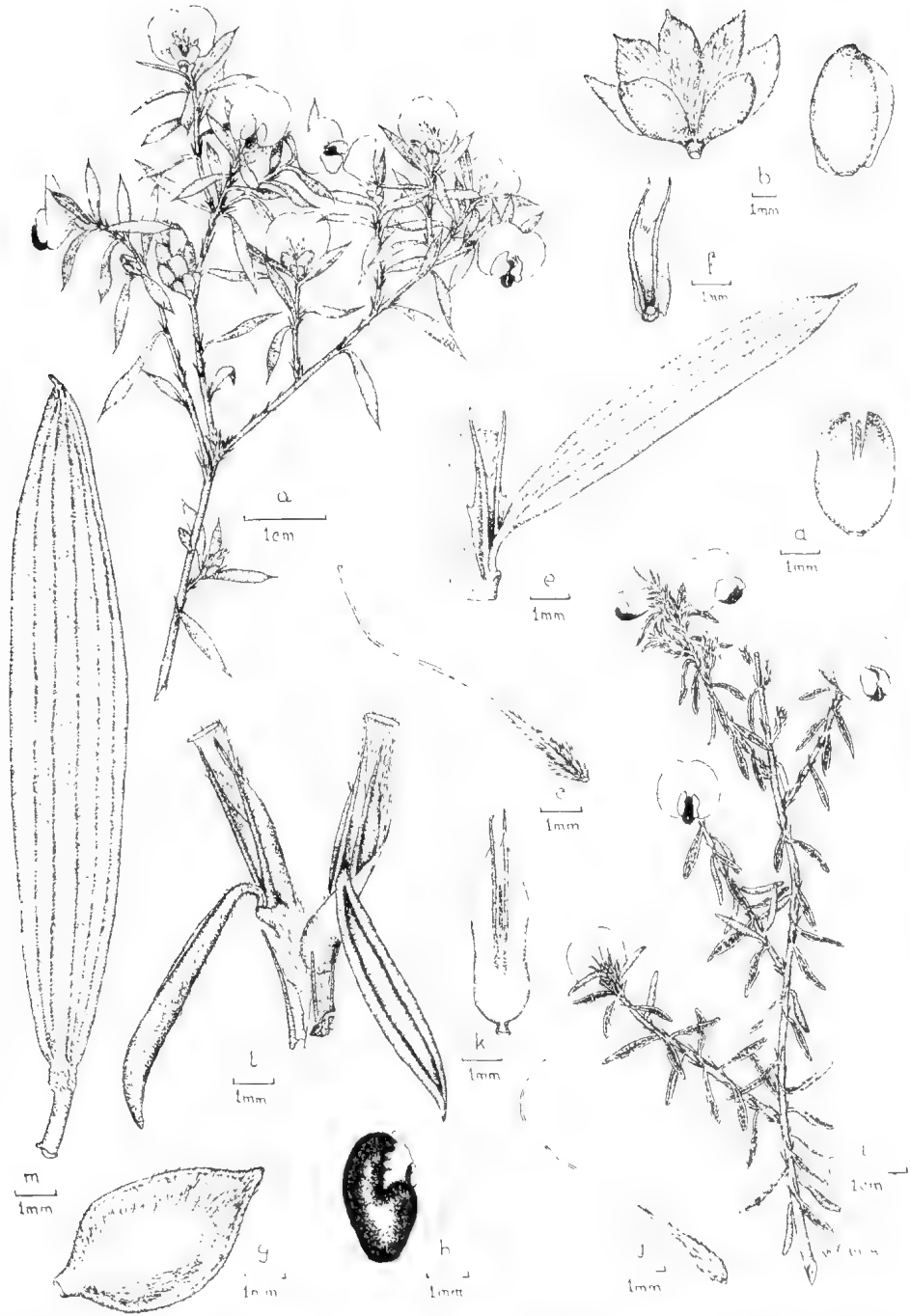

Fig.10. a-h, *P.muelleri*; a, habit; b, calyx and bracteoles, bracteole drawn a little larger; c, ovary and style; d, floral bract; e, leaf and stipule; f, stipule; all from MEL 516836; g, pod; h, seed; from MEL 35234. i-l, *P.muelleri* var.*reflexifolia*; i, habit; j, ovary and style; k, floral bract; l, leaves and stipules, all from MEL 516838; m, long leaf form from Powelltown MEL 516837.

Lake Mt. Its flowering period, from mid November to January, is later than most lowland species.

Bentham described the species from material collected and sent to him by Baron von Mueller and after whom he named it.

P. muelleri var. *muelleri* is usually a fairly dense erect shrub up to 1.5m high, but this varies according to situation, at higher altitudes it is smaller and more compact. The alternate, flat or slightly concave leaves are 7-15 mm long and 1-2 mm wide tapering into a pungent point which is sufficiently strong to make the plant feel slightly prickly. The upper leaf surface is glabrous, the underside has a few scattered hairs and is darker in colour with a prominent mid vein and two to four less prominent parallel veins.

The brown, papery stipules have a prominent mid-rib and are about 2 mm long and often joined, so that on young growth, where the leaves are close together, the stem may be almost concealed by the stipules.

The flowers are usually single and terminal, occasionally they are paired or may appear clustered when several short branchlets are close together along a stem. The ovary and style are covered with short, silky hairs.

The calyx is silky with long appressed hairs and is almost hidden by the large enveloping bracteoles. These are 3 mm long and 2 mm wide, concave and papery with obtuse ciliate tips. They are attached at the base of the calyx tube and reach half way up the lobes. Immediately below the calyx and partly concealing the bracteoles are several closely imbricate bracts similar in texture to the bracteoles but somewhat smaller.

Fig.10a. Known distribution of *P.muelleri*.

In the hills around Powelltown and the Latrobe River watershed a particularly long-leafed form occurs, with leaves up to 20 mm in length.

Typical *P. muelleri* is occasionally confused with *P. juniperina* var. *mucronata*, but the latter species has narrow lanceolate bracteoles and lacks the persistent bracts of *P. muelleri*.

P. muelleri var. *reflexifolia* J. H. Willis in Vict. Nat. 57: 98(1940) occurs in several areas to the west of Melbourne. It is generally a much smaller plant, sometimes less than 30 cm high; it is distinguished by the strongly reflexed leaves which give the plant a rather withered appearance. the stipules and calyx lobes are also longer and more finely pointed. It has been recorded from several places in the Wombat Forest, west of Gisborne, and also from Daylesford, Skipton and Apollo Bay.

SPECIMENS EXAMINED included: var. *muelleri:* Mount Barkly, *F. Mueller*, Jan. 1863, (MEL 35234, Isotype) Lake Mt., E. of Echo Flat, *J. H. Ross 2471*, 8.i. 1977, (MEL 516836); Powelltown, *J. H. Willis*, 12.xii. 1977, (MEL 516837), Mts Erica & Baw Baw, *H. B. Williamson*, 2.i. 1905 (MEL 516840); Var. *reflexifolia:* Skipton, *Rev. W. Whan 149*, (MEL 35232, Holotype); Wombat Forest, *B. Kemp* 30.xi. 1976 (MEL 516838).

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The M.A.Ingram Trust

BY ERIC R. ALLAN

Two members of the F.N.C.V. who were very active in the Club affairs during their lifetime, left all their property to create a Trust in perpetuity for the protection and preservation of the fauna and flora of Australia.

This article is an account of how the Ingram family founded the M.A. Ingram Trust and what has been done with the funds it has provided.

The twin brothers John and Will Ingram were born in 1868 at Maryborough. Their father who had come out from Ayr in Scotland in 1852 had served his apprenticeship as a watch and clockmaker with his father in Scotland and in due course the twins became another generation to follow this profession. In 1892 they founded the firm of Ingram Bros. and for over half a century in Swanston Street were well known as master clockmakers. They installed the first electrical clock systems in Melbourne and were responsible for timing every record of the Victorian Amateur Athletic Association from 1895 until just before they died, Will in March 1945 and John in December 1946.

They enjoyed walking in the Australian "bush" and took a keen interest in the wild life. Will Ingram became a member of the F.N.C.V. in June 1919 and from 1931 until June 1942 he carried out the duties of honorary assistant librarian. John Ingram became a member in October 1926 and from 1929 until 1942 carried out the duties of honorary treasurer. Both of them led or participated in many of the Club excursions.

Their father had died in 1885 and with their Mother and two sisters Mary and Janet they lived in the house they had built in Clowes Street, South Yarra.

Neither the twin brothers or their two sisters married so that having no dependants, and in view of their great interest and concern for the wild life of Australia, the four of them decided to make identical Wills in which, apart from a few small bequests, all their Estates would be held in perpetual Trust and the income would be used for the protection and preservation of the fauna and flora of Australia and to encourage research and increase of knowledge with respect to the origin, history, habits, life and use and the scientific benefits, if any, of indigenous Australian (especially Victorian) mammals and birds, and the flora providing their food, cover and breeding facilities.

The Wills provided that the Trust should be known as "The M.A. Ingram Trust" as a memorial to their Mother, Mary Ann Ingram.

On the death in 1947 of Janet, the last surviving Ingram, the Executers began to take the necessary legal steps to set up the Trust. The Executors were the Public Trustee, Mr. C. E. W. Bryant a Solicitor and member of the R.A.O.U., Mr. A. S. Chalk a member of the F.N.C.V., Mrs. Mary D. Graham a friend of the Ingram family and Eric R. Allan a cousin of the Ingrams.

The income from the Trust which at present in 1977 amounts to approximately $17,000 per annum, has been used for a great variety of purposes within the terms of the Trust and details of some of these are given in the following paragraphs.

Some details of Trust-income spent

Grants to the R.A.O.U. to assist with the printing costs of its journal the "Emu" and its Index.

to the F.N.C.V. to assist with the printing costs of the "Victorian Naturalist" and of "Nature Show" leaflets for nine years.

to the Bird Observers Club to assist with the cost of printing special articles in "The Bird Watcher" and the booklets "Field Guide to the Waders" and "Field Guide to the Hawks".

to V.O.R.G. to assist with printing costs of "Handlist of Victorian Birds" and with Field Observation Cards.

to the Gould league of Bird Lovers for printing of Field Guides to Victorian Birds.

to S.A. Ornithological Association to assist with printing of "S.A. Ornithologist"

to Geelong F.N.C. for printing of booklet "Care of sick, injured & orphaned native birds and animals"

Provision of water storage pond for wildlife at Wyperfeld National Park.

Purchase of 3929 acres of virgin Mallee land at Wandown to retain the habitat of numerous Lowan, kangaroos and Mallee birdlife.

Purchase of 157 acres land at Ocean Grove for Geelong & District Natural History & Environment Centre.

Grant towards cost of Helmeted Honey Eater Survey Centre of B.O.C. at Yellingbo.

Grant towards cost of Nature Conservation Survey of Victoria by Victorian National Parks Association.

Radio carbon datings re sites containing bird and animal bones.

Provision of Finch Aviary at Healesville Sanctuary.

Assistance with cost of Behavioural Laboratories at Monash University.

Excavation of McEachern's Cave, Lower Glenelg National Park, by Jeannette Hope.

Study of Rock Wallabies from Arnhem Land, by Dr. J. E. Nelson.

Study of Seals at Seal Rocks, off Phillip Island, by Fisheries and Wildlife Division.

Study of Peregrine Falcon by Dr. Clayton White

Basic Studies of Marsupials by Fisheries & Wildlife Division Study of Mutton Birds (Short

tailed shearwater) by V.O.R.G. Provision of equipment for Mammal Survey Groups of F.N.C.V., Victoria, of Ballarat, and of Macedon Range Conservation Society.
Grants have been made to assist with the cost of many research projects carried out by qualified persons at Universities, on marsupials, bats, desert animals and birds.

Up to 30th June 1977 a total amount of approximately $173,000 has been paid out as grants to assist with projects such as detailed above.

The present managing Trustees are — Mr. Eric R. Allan (Cousin and original Trustee) Mr. James H. Willis (Nominee of the F.N.C.V.) Mr. Jack Jones (Nominee of the R.A.O.U.) Professor Graeme Campbell (Professor of Zoology, Melbourne University) and the Public Trustee is Custodian Trustee, that is he is responsible for the investments of the Trust and the maintenance of proper accounts.

The Origin of Generic Names of the Victorian Flora
Part 2 — Latin, Greek and Miscellaneous

(Continued from page 263 in the previous issue)

BY JAMES A. BAINES

***Pastinaca.** Lat name for the carrot, later for the parsnip when daucus was used for the carrot. The name, according to Jaeger, is from Lat pastinum, a dibble with carrot-like form; confirmed by Gilbert-Crater, as from pastino, dig or trench the ground; and by Smith and Stern, as from pastus, food. **P. sativa,* Parsnip, is in tribe Peucedaneae of family Umbelliferae, the tribal name stemming from the generic synonym *Peucedanum,* by which it is again called by some modern botanists.The surname of Boris Pasternak, author of many poems and of 'Dr. Zhivago', is the Russian word for parsnip, and is in fact the same Latin word in a Slavonic guise.

Pelargonium. Gk pelargos, a stork; because the fruit has a 'beak' not unlike that of a stork, hence the common name stork's-bill for most of the species. Victoria has five native species, the commonest being *P. australe,* Austral Stork's-bill, and three introduced, including **P. domesticum,* Garden 'Geranium'. Family Geraniaceae has five genera, of which three are represented in the State's flora — *Geranium, Erodium* and *Pelargonium* named respectively after the bills of the crane, heron and stork. The genus *Pelargonium* has 250 species, *Geranium* 400 and *Erodium* 90, so the 'geranium' misnomer can be pardoned! *P. inodorum,* also native to N.Z., is known by the Maori name Kopata.

Pellaea. Gk pellaios, dark; alluding to the stalks which are generally dark. Our sole species, *P. falcata,* Sickle Fern, was formerly classified in the genus *Pteris.* The genus is in family Adiantaceae, and the name should be accented on the second syllable, though a first-syllable stress is often heard. The specific epithet means sickle-shaped (Lat falx was used for both sickle and scythe).

Pennisetum. Lat penna, a feather; seta, bristle; the flower of these grasses having long, feathery bristles. Victoria has one native species, *P. compressum,* Swamp Foxtail-grass, and three introduced, Kikuyu Grass, African Feather Grass and Feathertop. Kikuyu is named after the Kenya tribe of that name, and the first syllable should be pronounced like key, not kye as often heard.

Pentachondra. Gk pente, five (in compounds, penta-); chondros, a grain; in reference to the five-parted fruit. Our sole species, found in the Alps, is *P. pumila,* Carpet Heath, also native to N.Z., where it is known as Little Mountain Heath, and to Tasmania, which has two other species endemic there. The genus is in family Epacridaceae.

Pentapogon. Gk pente, five; pogon, beard; the flowering glume having five awns. Our sole species is *P. quadrifidus,* Five-awned Spear-grass. It is a monotypic endemic Australian genus, set up by Robert Brown in 1810, five years after Labillardiere had named the species as an *Agrostis.*

(To be continued)

Australian Natural History Medallionist for 1977: John Russell Wheeler

There are two noteworthy points to make about the award of the Australian Natural History Medallion for 1977 to the prominent Geelong naturalist Jack Wheeler. Of the 38 Medallionists, 17 have been professionals in the sense that their regular paid employment was in the scientific field, usually in universities, research institutes or herbaria, or in Government departments, while 21 have been amateurs in the sense that they earned salaries in other occupations and became experts in natural history or some branch of it because of their enthusiasm for a hobby interest that spread over many years, with eventual recognition far and wide. Jack Wheeler comes into the latter category, as does his brother Roy, who won the same award in 1965. They are the second pair of brothers to be so honoured, which is the other noteworthy point referred to above. The other pair of brothers, Dominic and Vincent Serventy, won the medallion in 1956 and 1974 respectively. Perhaps birdwatching runs in families, as all four have distinguished themselves in ornithology.

John Russell Wheeler was born on 22 April, 1909 at Coleraine in Victoria's Western District, and was educated at the local primary and secondary schools. His occupation for over 20 years was in the Transportation section of the Victorian Railways, and for 29 years in the Dairying section of the Department of Agriculture. This service was interrupted by his participation in World War II, serving in the Middle East and New Guinea, 1940-44, holding the army rank of lieutenant. He is still active in the Rats of Tobruk Association. Although nominally retired, he may be said to have the occupation of 'full-time naturalist', as he is involved still in a wide variety of activities in ornithology, botany, ecology and conservation. When living in Ballarat, he became joint founder in 1952 of Ballarat Field Naturalists' Club, of which he was secretary for the first six years, being made a life member in 1958. He began contributing a nature column to 'The Courier' (Ballarat daily newspaper), under the name 'Nature Notes', modestly conducted by 'J.R.W.', which is now in its 20th year, appearing in each Saturday issue.

When he transferred to Geelong, he became a foundation member of the revived Geelong Field Naturalists' Club (the original club had begun in 1880, only a few months after the formation of the F.N.C.V.). He was vice-president, 1961-4 and 1976-7, president, 1965-71, and has also held at various times the offices of treasurer, excursion secretary, editor of monthly newsletter, and botany group member. This is a very active club, with meetings largely attended, and many excursions and campouts. The two key members are Jack Wheeler and his friend Trevor Pescott (who

Mr. Jack Wheeler

edits 'Geelong Naturalist', and conducts the nature column called 'By Field and Lane' in the 'Geelong Advertiser'). The Juniors meet each month before the main meeting, and Jack Wheeler has many times delivered lectures to these keen young people, and given them the benefit of his practical experience.

Birds were Jack Wheeler's first enthusiasm, and they continue to be a major interest for him. Joining the Royal Australasian Ornithologists' Union and the Bird Observers' Club in 1950, he has contributed important papers over the years to their respective publications, 'The Emu' and 'The Australian Bird Watcher', and articles have appeared in the Gould League's 'Bird Lover' and 'Survival', 'Geelong Naturalist', 'Bendigo Naturalist', 'Bird Observer', 'Canberra Bird Notes', 'Wildlife in Australia', 'Victorian Naturalist', and 'The Bird Bander'.

Bird banding has taken up many hours of Jack Wheeler's life. Number 24 Bird Bander's A Licence was issued to him in 1955, and is still current. Some of the species he has banded include: Silver Gull 3000, Mutton Birds 5000, Australian Gannets 450, White-faced Storm Petrels 400, Black Swans 700, Banded Plover 500, Spur-winged Plover 500, Gull-billed Terns 50, Giant Petrels 42 — and he has even banded one Wandering Albatross! He has taken part in bird population counts at Lake Wendouree, Lake Natimuk, Lake Wallace, Lake Brambruk in Wyperfeld National Park, and Reedy Lake at Leopold, making a complete circuit of each lake.

He led the local challenge bird counts for five years, and took part in World Bird Day lists. A special project was his regular visits to the Wedge Light gannetry in Port Phillip Bay, first found to be active in 1966 and gradually building up since then; also regular visits to Fort Island, where an important overflow rookery of the White-faced Storm Petrel exists near the main breeding rookeries of Mud Island near Queenscliff. Wheeler has often visited other sea-bird refuges, such as Lady Julia Percy Island and Griffith Island (near Port Fairy) and Lawrence Rocks (near Portland). He is carrying out individual studies on the breeding of certain species: in the Geelong region, Nankeen Night Heron, Banded Plover, Fairy Tern and Spur-winged Plover; and in the Ballarat area, Black Swans on Lake Wendouree.

Perhaps Jack Wheeler's greatest contribution to conservation is his involvement with the Ocean Grove Nature Reserve, of which he has been chairman of the Committee of Management since its inception in 1968 and continues in that office. This reserve, on land largely left in its original state of native vegetation by the Cuthbertson family, was originally of 200 acres (81 hectares), but was expanded to an area of 357 acres (143 ha) by public appeal which raised $78,000 in 1964, personally conducted by Wheeler and Pescott. Eventually, with the help of Government funds, it will be known as the Geelong and District Natural History and Environment Centre. This reserve is open to the public, and is being increasingly known and visited, and many school visits take place, with volunteer guides showing the main features, which include nature trails, ant colonies with larvae of the rare small Ant Blue butterflies, koalas and areas planted with thousands of native shrubs and trees. Jack Wheeler spends 2-3 days every week in attendance in an honorary advisory capacity, and carrying out plantings and general supervision.

Another of his conservation efforts has been the organization of regular plantings of native trees and shrubs, and excursions for the eradication of boneseed (now a major threat there as on the coast) at the You Yangs. From 1963 he has been a member of the Committee of Management of the You Yangs Forest Park, and in this capacity has worked co-operatively with many members of the Geelong F.N.C. and the Bird Observers' Club. He has taken a leading part in the surveys and submissions for the proposed conservation of Mount Cole Range, and was author of the 31-page report so well received by the Minister of Forests. He led deputations for Lake Connewarre Wildlife Reserve, Edwards Point Fauna Reserve (St. Leonards), Bannockburn Fauna and Flora Reserve, Bambra headwaters of Retreat Creek, Flax Mill Swamp (Wendouree), and other areas.

Jack Wheeler has been in the forefront of moves for the conservation and reservation of adequate areas of the Otway Ranges and adjacent coastlands, and, with other members of Geelong Field Naturalists' Club (which has often held campouts in various parts of this magnificent region and built up a fund of practical knowledge of its ecology), he took part in the Otways seminar at Lorne.

The 1977 Medallionist has been a regular lecturer at field naturalists' clubs throughout Victoria, and these talks are illustrated with his photographic slides drawn from a large collection on birds, insects, mammals, marine creatures, trees, wildflowers and general conservation. Schools too have often benefited from his expertise, and he has taken an active part in wildflower shows of Geelong F.N.C. and Angair, the progressive conservation society of Anglesea and Airey's Inlet. He has taken an active role too in the Western Victorian Natural History Clubs Association, comprising all F.N.C.'s in the western half of the state, which holds get-togethers and local excursions in each town in rotation — he was president in 1975-76. He was on the original Steering Committee for the Victorian Field Naturalists' Clubs Association in 1972, and has been a delegate ever since. Other activities have included the New Guinea Bird Society and the Australian Seabird Group.

Jack Wheeler conceived the need for, and carried out the authorship of, a recently-published small book called 'The Care of Sick, Injured and Orphaned Native Birds and Animals', issued by Geelong F.N.C. and financed by donations solicited from local industry, conservation groups and individuals. The book is distributed free of charge, and an initial printing of 20,000 copies has been exhausted. All schools, most libraries, conservation groups, and even South Australian, N.S.W. and Tasmanian recipients, have been given copies, so that proper care will be able to be given to our distressed fauna. He has compiled brochures on 'Birds of Ballarat and District', 'Birds of Northern Territory and East Kimberleys', 'Birds of South-East Asia', 'Introduction to Ocean Grove Nature Reserve', 'Introduction to Batesford Sanctuary', 'Bird and Plant List of Inverleigh Common', 10 year editor of 'Geelong FNC Newsletter'. Batesford Sanctuary is 208 acres of natural bushland conserved by the Belcher family of 'Lilydale House', and Jack Wheeler had carried on for some years a correspondence with the late Sir Charles Belcher, who died in his 90's at Kokstad (South Africa) after having been successively Chief Justice of Trinidad, Nyasaland and Kenya; in his young manhood he wrote the now rare but valuable book, 'The Birds of the District of Geelong', published in 1913.

Jack Wheeler married Trixie Hansen in 1932, and they have two daughters and seven grandchildren. The medallion was presented at the November meeting of the F.N.C.V., and the recipient of the award gave an illustrated address on conservation aspects of his various projects.

J. A. Baines

Koala, Australia's "native bear"

Some facts gathered by a layman

BY M. J. LESTER*

The koala is not remotely related to the bear family but its imperceptible tail was probably the cause of the early name "native bear". And several years later it was given the scientific name *Phascolarctos* meaning "pouched bear". The specific appendage *cinereus* means "grey".

The strange animal was first reported from the Blue Mountains in 1798, first described in a scientific journal in 1808, and illustrated in 1810 under the title "Koala or New Holland Sloth". It had also been called a monkey.

Feeding, etc.

The koala is probably the most specialised of our marsupials. It lives almost exclusively on eucalypt leaves. In Victoria its favourite is Manna Gum *Eucalyptus viminalis* but the diet is varied with a few other species. And it is a careful feeder. At certain times the leaves build up prussic acid and the koala might cover a lot of ground during the night looking for non-poisonous ones.

It sleeps most of the day, rouses at dusk to begin feeding and consumes two to three pounds of leaves at a sitting. Occasionally it wakes for a snack during the day.

There is a 2-metre extension of the intestines to cope with such a bulky diet, and digestion is aided by bacteria which the young koala acquires from its mother in its early "pap" food described below.

The name koala is derived from an aboriginal word meaning "no drink animal". Some observers state that drinking causes sickness.

When disturbed from its daytime sleep, the koala's puzzled babyish expression enchants the onlooker, but many knowledgeable persons consider the animal unusually stupid.

Young

When born, the single young is little more than a centimetre long; it makes its way to the pouch and attaches to one of the two teats.

The pouch opens backward as in the wombat and suggests that the two have the same ancestors. A backward-opening pouch makes sense for a burrowing animal, but for a tree-climbing one it means that the pouch opens downwards. To prevent the young from falling out there is strong muscular control at the entrance.

Long before the young koala is able to leave the pouch, its mother's milk becomes insufficient and is supplemented in a strange way. At certain times the leaves eaten by the mother are not wholly digested but are broken up into a sort of pap which passes through her digestive tract to the anal opening. The young koala puts its head outside the backward-opening pouch to eat the pap. It feeds this way once a day.

After about six months the cub is too big for the pouch and is carried on its mother's back up to another six months.

Distribution. Conservation in Victoria

Fossils indicate that the koala once existed in Western Australia, but it is now limited to south-east Queensland, east NSW, Victoria, and south-east South Australia.

Koalas were abundant in those areas when the white man arrived, but by the 1920s there were fears of extermination. The koala is prone to respiratory and other diseases and there had been two bad epidemics. Another hazard was its fur. Thousands of pelts were exported yearly and mounted to 2 million in 1924 alone.

In 1925 Victoria's Fisheries and Games Department made a survey of existing koala colonies and estimated the survivors at about 500. An active conservation and publicity programme was initiated. The koala was given full protection (it is now protected throughout Australia) and many of the survivors were taken to Phillip Island which was fairly secluded and had plenty of the right food trees. By the 1930s, numbers had increased sufficiently to begin re-stocking mainland areas.

These days, when we hear of wildlife officers moving koalas from one place to another, it is simply because the increase of numbers has endangered their food supply. There is no longer any fear of extinction.

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General Meeting
Monday 12 December 1977

Hawthorn Juniors were the speakers at this meeting and they provided an eye-opener to many of us on their Club.

History, aims, activities. Wendy Clark, President of Hawthorn Junior FNC, reported that the Club was started in 1943 by Mrs Fream and continued with Mr Fische. Then Mr Dan McInnes was president for ten years and built the Club into the lively organisation it is today. Now the Club is run wholly by the juniors themselves, Council members being elected from the age of 12.

The aims of the Club are to stimulate interest and enquiry on all aspects of natural history; this is done by monthly meetings with emphasis on exhibits, day trips, Easter camps and special week-end trips. Parents and other adults are welcome at all these events and are usually present in considerable numbers.

Wendy then spoke of the success of several previous members of the Club.

Animal skeletons are of special interest to Malcolm Turner, and he declared that much can be learned from them about the animals' life habits, especially from the skull. He displayed a Wombat's skull and one of its large continually-growing teeth that are used for grinding vegetation. He showed the bird-like skull of an Echidna with a curiously thin stick-like lower jaw, compared the skull with frontal eye sockets of a cat with that of a possum, and the skull of a Kookaburra and a falcon indicating their different eating habits.

There was a stuffed Lesser Long-eared Bat with wings spread, and a fully mounted Brush-tail Possum. The beautiful wing of a Barn Owl was much admired and Malcolm explained how it ensures silent flight.

Lyrebirds were talked about by Rosemary Fearon, a very young member.

Lichens consist of two plants — an alga and a fungus. Barbara Thomson continued to explain that lichens serve as pioneers to break down rocks in preparation for larger plants. In her exhibit of lichens, she drew attention to the fruiting bodies of the alga part.

Railway reserve between Alamein and Burwood has been thoroughly explored by Robert Muir. He spoke of the several native plants and grasses that still survive there, birds and their nests, and the ants.

Specimens from the reserve included four native grasses: Common Wallaby-grass *Danthonia caespitosa*, Long-hair Plume-grass *Dichelachne crinita*, Kangaroo Grass *Themeda australis* and Common Wheat-grass *Agropyron scabrum*. Four small bottles contained a jumping ant, meat ant, sugar ant, and a bull ant. There were photos of the reserve and a copy of an article that appeared in this journal October last year, Vol.93 No.5.

Chart of birds at Webb Dock near Westgate Bridge was displayed by George Appleby, aged 9. Unfortunately George could not be present and the amazingly comprehensive chart was talked about by Wendy Clark.

Easter family camps began in 1970 and continue as the star annual event. Angela Fearon showed slides of incidents and views at the various locations. Most campers travel by private car but a bus is chartered for those without cars. There are 80-90 people at each camp.

Cane toad in Victoria? Malcolm Turner spoke of a week-end trip with a specific aim — to examine reports that the cane toad was present in the Strezlecki Ranges. His slides showed some of their search methods and what they found — Striped Marsh Frog and Bull Frogs. The investigators concluded that the 6-7 cm specimens had been magnified by other observers to cane toad size.

FNCV President thanked the Hawthorn Juniors for providing such a varied and informative evening.

Exhibits. Most of the exhibit space was occupied by material from the Juniors as listed to each speaker.

Aquatic caterpillars (about 8 mm) were

displayed in a dish among water milfoil, and they had cut small pieces of milfoil and used them as a covering like the case-moth caterpillar uses sticks; under the microscope, a caterpillar was seen to be emerging from the egg. Marine plankton under a microscope showed various forms.

Coastal Spinifex *Spinifex hirsutus* was exhibited as a genuine spinifex in contrast to the so-called spinifex of the inland which is really a species of Triodia; naturalists prefer to call the latter Porcupine Grass. A flowering head of Marram Grass *Ammophila arenaria* (not Australian) was covered with dangling stamens.

General Meeting
Monday 9 January 1978

The first meeting of the year is traditionally a members' night and there were five contributions.

FNCV Badge. With colour slides and drawings, Miss Madge Lester gave something about the botany and history of the Club badge — Common Correa *C.reflexa*.

Walkabout. Mr Garnet Johnson showed colour slides of various places, birds and flowers in Australia.

Huon Pines were spoken about by Mrs Margaret Corrick. *Dacrydium franklinii* belongs to a primitive group of conifers and is limited to a few areas in Tasmania's rain forests. Previously inaccessible regions are being opened up by the Electricity Commission and Huon Pine is again being harvested in quantity. The timber is remarkably long-lasting and can remain in water for years yet still be sound. Slides showed cross sections of trunks and timber uses.

Central Australia. Dr Brian Smith spoke of a recent Museum expedition to Central Australia following the route of the 1894 Horne expedition. Slides showed the interesting country along the way and some of its land snails.

Norwegian fiords and mountains. Dr Alan Parkin showed movies of his recent trip in Norway.

Exhibits included the larvae, pupa and eggs (under a microscope) of the Australian Admiral Butterfly *Vanessa itea*; the introduced nettle *Urtica urens* is grown as the food plant. A larva of the moth family Anthelidae was 6-7 cm long, about 1.5 cm diameter and very hairy; its cocoon alongside bristled with hairs which the larva pushed through when it pupated. And there were other caterpillars.

Photographs showed a Coastal Banksia tree *B.integrifolia* at Beaumaris with a girth of 15ft 8in, and a large Bull Mallee *Eucalyptus behriana* near Bacchus Marsh; people were asked if they knew of any other trees with exceptional girth.

A bowl made of Huon Pine was giving off its characteristic aroma.

FNCV Success Story!

"Ferns of Victoria and Tasmania" by N. A. Wakefield was first published by this Club in 1955. In 1975 it was revised and up-dated by Dr.J.H.Willis and 3500 were sold within nine months. Another 2100 were printed and have almost sold out.

Perhaps this result is hardly suprising for the book is tremondous value at $3.25 (less to FNCV members).

In June 1977 Council decided to print another 5000 with the addition of four pages on the cultivation of ferns. This 1977 edition has received further up-dating by Dr Willis and will be released for sale in 1978. The retail price has not yet been decided.

Overhead Projector for Group Meetings

Our Study Groups have been asking for an appliance that will project drawings or diagrams large enough to be seen by all members in a small area. Here it is:

Standard overhead projector 213 is compact and easily used by the speaker. He faces his audience and draws on the transparent sheets that are about 25 cm square (10″). Or the drawings can be made beforehand and projected when the speaker wants them. This will spare us many a scratchy or too-small-to-see effort on the blackboard.

But the projector is a costly item (more than $300) that needs careful handling. Groups will be asked to designate one or two

projectionists and they will receive a demonstration and hints for use.

It will be kept in our library under a plastic cover and Council has decided that it must not be removed from the Herbarium hall except by special permission.

How it was paid for. The projector has been purchased with income from the W. C. Woollard Fund and the D. E. McInnes Fund. These funds were derived from the making and sale of the FNCV microscope during the 1960s.

Members of the Microscopy Group had discussed the need for a low-power inexpensive microscope, and in 1963 Mr Woollard devised the FNCV instrument. He, Mr McInnes and other members constructed more than 150 with the components neatly fitted in a hardwood case. They were sold to Club members at £12.15 ($25.50). Microscope tubes were also supplied without cases to handymen members who could make their own.

FNCV microscopes — old or new. We are grateful to Dr Beadnell who has given one of the original FNCV microscopes to the Club. It is used at each General Meeting.

Now that microscope tubes are again available (far better quality than previously) members could use the FNCV instrument as a model to build their own. These better tubes cost $24. See Dan McInnes about them.

Open days at our Kinglake property

In "The Naturalist" of March/April 1976 and 1977, also in September/October 1977, we were enthusiastic about the Kinglake property and its possibilities for use by members. Now equipped with a toilet, barbecue (not to be used on fire-ban days) and tank water, Council has decided that the first Sunday in each month shall be "Kinglake Day" and invites all members for a good day in the bush. New members and country members are especially welcome.

Please wear name tags, sign the visitors book, and let the warden know you have arrived. You can sit and talk, follow the nature trail, go for a hike, do some odd jobs if you bring a rake or spade, or simply laze and enjoy the fresh air. If you wish to study in a serious fashion, go out with one of the groups.

Unless requested, we do not propose to meet in June, July or August. Warden on duty for March, April and May will be Garnet Johnson, phone 56 3227. May will be a good month for fungi in which the property is astonishingly rich.

See map below for location. Gate at McMahons Road will be open at 10 am; drive in, keep left, and angle park.

Vacancy on Kinglake Committee

We need one or two active members with ideas and enthusiasm to help develop our Kinglake project. It is a valuable property and alert minds will find good ways to make the most of its possibilities. Please contact Tom Sault, Garnet Johnson or the President.

FNCV Subcriptions were due on 1st January

If you have not already paid your subscription, please do so at the next General Meeting or post to Mr. F. Koth, 21 Smart Street, Hawthorn, 3122. The expense of sending out reminder notices is colossal.

(Continued from page 2)

GROUP MEETINGS

(All FNCV members are invited to attend any Group Meeting; no extra payment.)

At the National Herbarium, The Domain, South Yarra at 8.00 p.m.

First Wednesday in the Month—Geology Group

1 March: Members' mineral night.

5 April: To be announced.

Third Wednesday in the Month—Microscopy Group

15 February: Members' exhibits and discussion of the year's programme.

15 March: Microscopes—historical and modern. Demonstration of all types from the simplest to the most advanced. How to choose a microscope. 1-hour members' exhibits.

See the year's programme of Microscopy talks on page 22.

Second Thursday in the Month—Botany Group

Each meeting includes a ¼-hour session for beginners—various subjects.

9 March: "Orchids". Mrs Margaret Dacy.

12 April: To be announced.

At the Conference Room, The Museum, Melbourne, at 8.00 p.m.
Good parking area—enter from Latrobe Street.

First Monday in the Month—Marine Biology & Entomology Group

6 March: "Crayfish or lobster?" Mr D. E. McInnes.

3 April: "Aquatic insects". Mr P. Genery.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.

First Thursday in the Month—Mammal Survey Group

2 March. 6 April.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions.

GEOLOGY GROUP

Sunday, 12 March. Meet 10.00 a.m. at Loddon River Hotel, Bridgewater. Then travel to Mount Kooyoora granite pluton.

BOTANY GROUP

Saturday, 25 February. Dom Dom Saddle — Black Spur. Meet 9.30 a.m. at north side of Surrey Hills railway station.

Saturday, 11 March-Monday, 13 March. Creswick with VFNCA. See page 2.

Day Group—Third Thursday in the Month

Thursday, 16 February. Parliament House. Meet at 11.30 a.m. at the pond in Treasury Gardens.

Thursday, 16 March. Cliff-top walk to Beaumaris. Meet at Cheltenham railway station. Train leaves Flinders Street at 11.31 a.m. arriving at Cheltenham 11.37. Cars will ferry members to the starting point.

Thursday, 20 April. Train outing to Ferntree Gully National Park. Train leaves Flinders Street at 10.15 a.m., arriving 11.11.

GROUP CAMPS—Mammal Survey Group

18-19 February. Wallaby Creek.

11-13 March. Gelliondale, near Yarram.

Easter Camp, 24-27 March. Western Grampians.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron:
His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Honorary Office-Bearers 1977-1978

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Mammal Survey: Mr. MICHAEL HOWES, 10 Palmer Street, Fitzroy, 3065.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1977

Metropolitan	$10.00
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Joint Country	$10.00
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All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

JENKIN BUXTON PRINTERS PTY. LTD., WEST MELBOURNE

the victorian naturalist

Vol. 95, No. 2

March/April, 1978

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
In which is incorporated the Microscopical Society of Victoria

$1·20

Category "B"

Registered in Australia for transmission by post as a periodical

FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra

Monday, 10 April, 8.00 p.m.
Speaker: Dr Bill Birch, Curator of Minerals, National Museum of Victoria.

Monday, 8 May, 8.00 p.m. Annual General Meeting
Business: Minutes of 1977 Annual General Meeting.
Receive Report of Council.
Receive Balance Sheet and Statement of Receipts and Expenditure.
Elect Council (President, Vice-President and 10 Council Members).
Elect Office-bearers.
Speaker: Mrs Margaret Corrick, FNCV President.
Subject: Looking for Bush-peas.

Monday, 12 June, 8.00 p.m.
Speakers: Ms Alison Oates, Assistant Curator in Anthropology and Ms Annette Seeman, Education Officer, both from National Museum of Victoria.
Subject: Plant foods of Victorian Aborigines.

New Members — April General Meeting

Ordinary:
Miss F. B. South, 1/13 Tyndall Street, Surrey Hills, 3127.
Miss Alva Brunning, 4/67 Wattle Valley Road, Canterbury, 3126.
Brother J. C. Kissane, 2 Hutcheson Street, Moonee Ponds, 3039. Geology, Biology.
Mrs D. Mills, 29 McConchie Avenue, East Kew, 3101.
Mr U. B. Broadbent, P.O. Box 159, East Melbourne, 3002.
Mrs M. M. Cragg, 36 Harrison Avenue, Burwood, 3125. Botany and Geology.
Mr A. W. Thies, 25 Davies Street, East Malvern, 3145. Botany.
Miss Irene Evans, 2/81 Alfred Street, Kew, 3101. Botany.
Miss Kathy Dunk, 136 Holmes Road, Moonee Ponds, 3039. Botany.
Miss E. Yule, 65 Yarrbat Avenue, Balwyn, 3103.
Mr Chris Symons, 9/844 Lygon Street, Carlton, 3054. Botany.
Mr M. F. Cooper, Dept of Geology, Melbourne University, Parkville, 3052.
Mrs D. M. Rasche, Box 248, Preston, 3072.

Joint:
Miss Anne Sinclair and Mr I. Milton, C/- Post Office Hurstbridge, 3099. Flora and Fauna.
Mr and Mrs G. J. Higgins, 13 Grace Court, Mont Albert, 3127.

Country:
Mr G. Patterson, 20 Annerley Avenue, Shepparton, 3630.
Mr M. Wood, 35 Norwood Street, Herne Hill, 3218.
Mr Stephen Donnellan, 122 Bundock Street, Coogee, N.S.W., 2034.
Mr A. Wellington, 20 Holyman Street, Scullin, A.C.T., 2614.
Mr T. J. Parker, C/- Nhill High School, Box 210 Nhill, 3418.

Life Membership:
Mr Ronald C. Kershaw, 45 West Tamar Road, Launceston, 7250.

FNCV EXCURSIONS

Sunday, 16 April. Leader: Mr Graham Love. The excursion will be through Beveridge, Strath Creek and Flowerdale and includes a visit to The Junction mine. Mr Love will outline the geology and history of the area. Coach will leave Batman Avenue at 9.30 a.m. Fare $5.00. Bring one meal and a snack.

Sunday, 21 May. Leader: Miss Madge Lester. Subject: Ferns and general. The excursion will be by train taking Puffing Billy to Lakeside. By present timetables the train leaves Flinders Street at 9.33 a.m. to connect with Puffing Billy at 11 a.m., but it would be wise to confirm times when the winter timetables are issued. Bring one meal and a snack if desired.

Sunday, 18 June. Yan Yean and Toorourong Reservoirs. Coach will leave Batman Avenue at 9.30 a.m., fare $5.00. Bring one meal.

(Continued on page 83)

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Cover Illustration: *Amanita pulchella*, Healesville, Vic. (yellow, orange or salmon-red cap). Photo J. H. Willis.

The Toadstool Genus *Amanita*

BY J. H. WILLIS

Ninety per cent (or more) of all deaths from fungal poisoning can be ascribed to two species of *Amanita*, viz. *A. phalloides* ("Angel-of-death") and *A. verna* which secrete protoplasmic toxins. If eaten they cause severe gastroenteritis, with constant diarrhoea and vomiting that leave the victim dehydrated; at a later stage peripheral circulation fails and blood pressure drops to a critical level. Autopsies reveal extensive damage to the heart, liver and kidneys — at present the mortality rate from poisoning is more than 50%. Another group of *Amanita* species, e.g. *A. muscaria* (the well known orange-scarlet Fly Agaric) and brownish *A. pantherina*, have toxins that affect the central nervous system, inducing nausea, vomiting, headaches, muscular spasms, sweating, excessive salivation, respiratory difficulty, disturbed vision and sometimes violent hallucination; a patient may collapse and, should death occur, it is due to damaged heart muscles.

On the other hand, some species are excellent edible mushrooms (such as *A. caesarea*, *A. rubescens* and *A. vaginata*); but it requires expert knowledge to distinguish these from their highly poisonous congeners. It is not surprising that world authority Rolf Singer should state in *The Agaricales in Modern Taxonomy* (1962): "*Amanita* has been monographed frequently and special attention has been paid to it by numerous mycologists and amateurs". R. J. Bandoni and A. F. Szczawinski, in their *Guide to Common Mushrooms of British Columbia* (1964), describe the amanitas as "an extremely important group of mushrooms because of the number of poisonous forms included", while the late Elsie M. Wakefield in her *Observer's Book of Common Fungi* (1958 edition) says "The genus *Amanita* represents the highest degree of development in the gill-fungi."

But *how* does one recognize an amanita on sight? Here are the characteristics: mature fruiting-bodies or sporophores have a cap that is easily detached from its stem, white (occasionally cream or pale greyish) gills which are free from the stem, and *always* white spores; but an often occurring feature is a fleshy cup or volva ensheathing the stem-base, either loosely or tightly (sometimes in the form of two or three bracelet-like girdles). It is wise to avoid eating any toadstool that has a volva. Often, part of a veil-like membrane that originally covered the gill cavity remains on the stem

Amanita vaginata Goonmirk Range, E. Vic. (mouse-grey cap) photo. J. H. Willis

Amanita (aff. *A. ochrophylla)* Bunyip River N. of Labertouche, Vic (biscuity-cream cap) photo. J. H. Willis

Amanita (aff. *A. umbrinella*) Lake Hattah, N.W. Vic. (pale smokey-brown cap). photo. J. H. Willis

as a short pendulous skirt or ring. Stems may be swollen and bulbous at the base, while, in most species, torn fragments of a universal veil (the volva being part of it) persist on the cap as pale and usually scattered patches or mealy warts. Such superficial, rule-of-thumb tests for the genus as taste, smell, tarnishing effect on silver etc. are futile, if not misleading.

Species of these fascinating fungi are to be found in many parts of all continents (excepting Antarctica), but south-eastern U.S.A. would seem to have the richest representation. Those occurring in Europe, North America, temperate South America and tropical Africa are currently the best known. E. J. Gilbert (of Paris), having studied numerous types, admitted 102 species by 1941. During the past 37 years, many more species of *Amanita* have been discovered, most of which still await formal description by botanists. In Victoria, for instance, there are published records of only 13 species (seven being mentioned in the F.N.C.V.'s *Victorian Toadstools and Mushrooms*, 1963); yet it is obvious that at least twice that number are present here. Most kinds inhabit the drier open eucalypt forests but some occur in closed rain forest, others in subalpine woodland, on coastal heaths or even sand-hills of the Mallee; a few introduced species, like *A. muscaria*, are invariably associated with man-made plantations (e.g. of pines, oaks, birches, etc.)

It has been fortunate for Australia that Mr. Derek A. Reid (senior mycologist at the Royal Botanic Gardens, Kew, England) spent several months in 1976 collecting and studying our larger fungi, including amanitas. An immediate result of his research is the series of Latin diagnoses now presented in the *Victorian Naturalist*, as a necessary prelude to the full treatment of this genus in Australia.

Nominations of FNCV Council Members and Office Bearers

FNCV Annual General Meeting will be on Monday, 8 May, and nominations may be received up to that date. Nominations are required for Council members. Council consists of the President, Vice-President, Immediate Past-President, and ten other persons. The following offices are open for nomination: President, Vice-President, Secretary, Minute Secretary, Treasurer, Assistant Treasurer, Excursion Secretary, Librarian, Assistant Librarian, Editor. Such office-bearers might be members of Council or not. If you nominate a person for a particular office and he would also like to be a Council member, you must make the additional nomination of him as a Council member.

Think now of the people you would like to see on our governing body, and ask them if they will accept nomination.

FNCV Subscriptions Now Due

The financial year begins on 1 January 1978 and members are asked to pay subscriptions promptly to Mr. F. J. Koth, 21 Smart Street, Hawthorn, 3122.

New species of *Amanita* (fungi) from Australia

BY DEREK A. REID*

In preparation for a forthcoming monograph of the Australian Amanita species it has been found necessary to publish descriptions† of 13 new taxa mostly based on collections made in Victoria‡. In addition two new names are proposed viz. *Amanita austro-pulchella* Reid for *A. pulchella* (Cooke & Massee) Gilb. (1941) [non *A. pulchella* Imai (1937)] and *A. austro-straminea* Reid for *A. straminea* Cleland (1927) [non *A. straminea* Secr. (1833)].

It is intended to publish, elsewhere, full descriptions of all the Australian species of *Amanita* with a key for their identification. This monograph will include line drawings of the micro-characters and hopefully some coloured illustrations of the fruit-bodies.

Amanita austro-pulchella Reid, nom. nov.
Agaricus pulchellus Cooke & Massee in *Grevillea 18:* 1 (1889), Pl. 176 B.
Amanitopsis pulchella (Cooke & Massee) Sacc. in *Syll. Fung. 9:* 2 (1891).
Vaginata pulchella (Cooke & Massee) O. Kuntze in *Rev. Gen. Plant 3*(2): 539 (1898).
Amanita pulchella (Cooke & Massee) Gilb. in Bresadola, *Iconog. Mycol. 27*(2): 203 (1941) [nec *A. pulchella* Imai 1933].

Amanita austro-straminea Reid, nom. nov.
Amanita straminea Clel. in *Trans. R. Soc. S. Aust. 51:* 299 (1927) [nec *A. straminea* Secr. (1833)].
Aspidella straminea (Clel.) Gilb. in Bresadola, *Iconog. Mycol. 27*(1): 79 (1940).

Amanita dumosorum Reid, sp. nov.
Pileus 6.5 cm diam., plano-convexus, pallide bubalinus sed siccitate pallide stramineus, reliquiis volvae albis pannum singulum usque 2 cm. latum efformantibus. Margo striatus, glaber. Stipes 6.5 cm. altus, 0.9 cm. latus, cylindricus vel leviter clavatus. Annulus inconspicuus, membranaceus, angustus, supra striatus. Volva nulla. Lamellae albidae. Sporae amyloideae, 7.0-8.75 x 6.0-7.75 μm, latissime ellipticae vel ovatae. Basidia usque 46 x 10 μm, clavata, quadrispora, sine fibulis. Cheilocystidia clavata, ovata vel subglobosa, usque 35 μm alta, et 18 μm lata, saepe breviter catenulata. Reliquiae volvae pilei ex hyphis hyalinis, 4-18 μm latis et sine fibulis omnino efformatae.
Habitat: in open scrubby area, Two Peoples Bay, 27 km E.N.E. of Albany, Western Australia, *coll.* D.A. & D.G. Reid, R. Hilton & N. Brittan, 12 May 1976 [Typus].

Amanita egregia Reid, sp. nov.
Pileus 10-20 cm. diam., convexus dein planoconvexus vel ad centrum leviter depressus, nudus, viscidus, juventute albus, maturitate pallide brunneus sed marginem striatum versus cremeus; siccitate stramineocoloratus. Stipes 12.5-20.0 cm altus, 0.9-2.3 cm latus, basin versus leviter dilatatus, albus, fibrillosus vel furfuraceus. Annulus amplus, pendulus, membranaceus. Volva ampla, saccata. Lamellae albae. Sporae nonamyloideae, 9-12 x 8-10 μm, subglobosae vel latissime ellipticae. Basidia 32-45 x 10-12 μm, clavata, quadrispora, quoque basidio fibula basali instructo. Cheilocystidia subglobosa, usque 24 μm lata. Structura volvae ad basin stipitis ex hyphis sine fibulis omnino efformata.
Habitat: in lines in open eucalypt forest, possibly the remains of a huge "fairy-ring", Moggill, Queensland, *coll.* J.E.C. Aberdeen (No. 161), 4 Feb. 1954 [Typus].

Amanita gossypino-annulata Reid, sp. nov.
Pileus 2.2-4.0 cm diam., convexus dein planoconvexus, pallide hinnuleus, reliquiis volvae tenuibus albis coactis pannum singulum usque 6 mm latum efformantibus, demum nudus; margo laevis. Stipes circiter 3 cm altus, 0.5 cm latus, albus, cylindricus sed basi abrupte marginate bulbosus et hic usque 1.2 cm latus. Annulus bene evolutus, crassus, gossypinus. Volva nulla. Lamellae albae. Sporae amyloideae, 7.0-10.0 x 6.2-9.0 μm, globosae vel ovatae, raro latissime ellipticae. Basidia usque 59.4 x 11.0 μm, quadrispora, saepe fibulata. Hyphae subhymenii saepe fibulatae. Cheilocystidia saepe breviter catenulata, segmento ultimo sphaeropedunculato vel ovato, usque 20 μm lato. Reliquiae volvae in pileo (1) ex hyphis, 2-5 μm latis, hyalinis, muris tenuibus, saepe incrustatis et interdum fibulatis (2) ex cellulis ellipticis, ovatis vel globosis usque 30 μm diam. irregulariter dispositis sistatae.
Habitat: Lilly Pilly Gully, Tidal River, Wilson's Promontory, Victoria, *coll.* D.A. & D.G. Reid, 2 May 1976 [Typus].

Amanita griselloides Reid, sp. nov.
Pileus 6 cm diam., plano-convexus, argenteogriseus, reliquiis volvae tenuibus coacto-fibrillosis, griseis obtectus, his insuper pannis arachnoideis albis partim obtectis. Margo pilei laevis, glaber. Pileus in siccitate fusco-griseo-brunneus. Stipes usque 7 cm altus, 1.0 cm latus, albidus, basi leviter clavata et hic usque 1.4 cm lata. Annulus nullus. Volva nulla. Lamellae albae. Sporae amyloideae, 8.2-12.5 x 6.0-7.0 (-8.5) μm, ellipticae. Cheilocystidia non visa. Reliquiae

†These descriptions in Latin are to fulfil the requirements of the International Code of Botanical Nomenclature for new Taxa.
‡Type specimens of all these new taxa have been lodged for reference in the collections of the Royal Botanic Gardens, Kew, England.

*Royal Botanic Gardens, Kew, England.

volvae in pileo ex (1) strato griseo coacto-fibrilloso e cellulis subglobosis ovatis vel clavatis, usque 90 x 65 μm, succo repletis et hyphis, 2-8 μ latis, hyalinis, ramosis, sine fibulis et muris tenuibus irregulariter intermixtis (2) strato superficiali albo arachnoideo ex hyphis hyalinis ramosis prostratis efformatae

Habitat: 2 km north of Bow River on Highway 1, near Walpole, Western Australia, *coll.* D.A. & D.G. Reid, R. Hilton and N. Brittan, 13 May 1976 [Typus]

Amanita griseo-conia Reid, sp. nov.

Pileus usque 9.5 cm diam., primo valde convexus, hinnuleus, verrucis prominentibus chalybeis comeis uniformiter dispersis; dein aplanatus, verrucis collabentibus vel dilabentibus sed squamis fuscis minutis innatis relictis, squamae sub lente tenuiter pulverulentae. Margo pilei appendiculatus. Stipes usque 11.5 cm longus, 2.2 cm latus, cylindricus, albus, bulbo basali fusiformi immarginato; superficies dense et minute flocculento-squamata. Annulus nullus. Volva nulla, vel zonam inconspicuam verrucarum formans. Lamellae albae. Caro alba. Sporae amyloideae, globosae, subglobosae vel ovatae, 7.75-11.0 x 6.75-9.0 μm. Basidia 35.0-50.0 x 9.0-12.5 μm, quadrispora, basi fibulata. Cheilocystidia clavata vel sphaeropedunculata, usque 20 μm lata, basi saepe fibulata. Verrucae conicae in pileo ex cellulis abundantibus, globosis subglobosis vel clavatis pro parte maxima formatae, sed hyphae rariores hyalinae, fibulatae, muris tenuibus intermixtae. Maculae pulverulentae in pileo e cellulis globosis vel ovatis omnino formatae

Habitat: Lilly Pilly Gully, Tidal River, Wilson's Promontory, Victoria, *coll.* D.A. & D.G. Reid, 2 May 1976 [Typus]

Amanita griseo-velata Reid, sp. nov.

Pileus 4.5-5.5 cm diam., applanatus ad marginem laevis dein in centro leviter depressus, ardestaco-griseus sed puniceo-tinctus, vel ad discum fere niger, superficie polita vel leviter viscida sed reliquiis volvae pallido-griseis et coactato-pruinosis obtecta. Reliquiae volvae in centro pilei magis distinctae et hic in pannos tenues irregulares disruptae, sed peripheriam versus floccos minutos pruinosos (sub lente minute arachnoideos) efformantae. Pileus senectute saepe glabriusculus. Stipes usque 6 cm altus, basi 1.0 cm latus, aequalis vel apicem versus leviter angustatus, et basi breviter radicans, albus; superficie in zonas minutas tractiflexas diffracta. Annulus vix cohaerens, fugax nivi similis. Volva nulla. Lamellae albae. Caro alba. Sporae amyloideae, 7.0-10.0 (-11.5) x 6.75-8.5 (-10.5) μm, subglobosae, ovatae vel fere triangulatae, saepe aspectu truncatae propter apiculum conspicuum et nonamyloideum. Basidia 34-47 x 10-12 μm, quadrispora, basi sine fibula. Cheilocystidia ovata, usque 21 μm diam. Structura reliquiarum volvae pilei ex (1) hyphis, 4-5 μm diam., hyalinis, septatis, ramosis, muris tenuibus et sine fibulis (2) cellulis elongatis varie inflatis usque 112 x 45 μm (3) sphaerocystis usque 92 μm diam., vel terminaliter in ramis brevibus lateralibus vel in catenis brevibus productis

Habitat: Fernshaw Reserve, Victoria, *coll.* D.A. Reid, 29 May 1976 [Typus]

Amanita hiltonii Reid, sp. nov.

Sporophora brevia, sed robusta; juventute farinoso-floccosa. Pileus usque 6 cm diam., demum plano convexus, cremeo-albus vel argenteus, reliquiis volvae albis gossypino-floccosis (saepe centrum versus verrucas indistinctas efformantibus) omnino obtectus. Stipes usque 5 cm altus, 2 cm latus, albus, basi leviter clavata et radicanti. Annulus distinctus, membranaceus sed angustus. Volva nulla. Lamellae albidae, in sicco et in senectute pallide luteae. Odor nucum. Sporae amyloideae, 7.0-9.5 (-10.0) x 4.75-6.2 μm, anguste ellipticae. Basidia 48-55 x 7-10 μm, quadrispora, quoque basidio fibula basali instructo. Cheilocystidia clavata, usque 12 μm lata, saepe infra apicem constricta et late stipitata. Stratum farinoso-floccosum pilei ex cellulis globosis, ovatis et clavatis (usque 40 μm latis) sistens cum hyphis insuper, 2-4 μm latis, hyalinis, ramosis, varie inflatis, fibulatis, muris tenuibus, irregulariter dispositis et in proportione aequali intermixtis

Habitat: Dale Forest, Brookton Highway, Perth, Western Australia, *coll.* D.A. & D.G. Reid & N. Brittan, 9 May 1976 [Typus]

Amanita luteolo-velata Reid, sp. nov.

Pileus usque 5 cm diam., primo valde convexus, dein applanatus, pallide griseo-brunneus, strato contextus volvae pallido-luteolo tenui coactato-pulverulento omnino obtectus; in centro pilei stratum squamas indistinctas arachnoideas formans. Pileus exsiccatus brunneo-griseus, impolitus, strato coactato, tenui, concolori (non luteolo-tincto) fere uniformiter vestitus; squamis minus distinctis. Stipes usque 4 cm altus, 1 cm latus, sed basi clavatus et abrupte acutus, hic usque 1.5 cm latus, supra annulum albus sed inferne cremeo-luteolus. Annulus membranaceus, bene formatus, patens, pendulus, leviter striatus, infra cremeo-luteolus. Volva nulla. Lamellae albae. Caro alba. Sporae amyloideae, ellipticae, late ellipticae vel ovatae, 7.0-9.2 x 5.0-7.0 μm. Basidia 40-45 x 8-12 μm, quadrispora, basi sine fibula. Cheilocystidia breviter catenata; segmento ultimo sphaeropedunculato vel ovato, usque 20 μm lato. Stratum coactato-pulverulentum, in pileo pro maxima parte ex sphaerocystis vel cellulis ovatis formatum, vel terminaliter in ramis brevibus lateralibus, vel terminaliter in catenis brevibus segmentorum hyphorum; etiam ex hyphis frequentibus hyalinis ramosis muris tenuibus et sine fibulis formatum

Habitat: Darby Saddle, Wilson's Promontory, Victoria, *coll.* D.A., D.G. & P.M. Reid 8 July 1976 [Typus].

Amanita ochrophylloides, Reid, sp. nov.

Pileus usque 15.0 cm diam., convexus dein plano convexus, tandem ad centrum leviter depressus, pallido-brunneus, verrucis strobiliformibus numerosis obsitus; margo pilei juventute reliquiis velli conspicue appendiculatus. Stipes usque 10 cm altus, usque 2.6 cm latus, sed basin versus conspicue bulbosus et hic usque 4.5 cm latus, albus sed varie brunneo-discoloratus. Annulus distinctus, albidus, senectute aliquando fugax. Volva ad apicem bulbi stipitis limbum brevem liberum efformans. Lamellae pallide aureae, usque 1.3 cm altae. Odor dilute farinaceus. Sporae amyloideae, 7.0-9.0 x 6.5-8.5 μm (in cumulo), subglobosae vel ovatae. Basidia usque 75.9 μm longa, usque 13.2 μm lata, quadrispora, plerumque sine fibulis. Cheilocystidia breviter catenata; segmento ultimo clavato, ovato vel subgloboso et usque 18 μm lato. Structura verrucarum pilei ex stratis duobus sistens (1) stratum superficiale tenuissimum praecipue ex hyphis saepe ramosis, hyalinis, varie inflatis usque 14 μm latis, muris tenuibus et sine fibulis, ramis angustissimis, 2 μm latis, angulo 90° saepe exortis, (2) stratum magis profundum ex (a) hyphis abundantibus, usque 5 μm latis, vitreis, intricate ramosis et (b) cellulis abundantibus brevibus, clavatis, ellipticis, ovatis vel doliiformibus usque 60 μm longis, et usque 25 μm latis

Habitat: on rocky black soil, amongst bracken and under *Eucalyptus* sp. [of peppermint group], on B.B. Jordan Divide Track, between Roberts and the Jordan

River, South-East of Matlock, Gippsland, Victoria, 850m alt., *coll.* L.M. Green, 26 March 1977 [Typus].

Amanita pagetodes Reid, sp. nov.

Pileus usque 7 cm diam., convexus dein plano-convexus, sordide albidus, reliquiis volvae tenuibus pulverulentis vel subfloccosis pallidis vel bubalino-coloratis obtectus. Margo pilei laevis, reliquiis albis annuli conspicue appendiculatus. Stipes usque 9 cm altus, 1.5 cm latus, basi bulbosa immarginata et hic usque 3.0 cm lata, albidus, apicem versus floccis conspicuis albidis vel pallido-bubalinis ornatus. Annulus fugacissimus. Volva nulla. Lamellae albae vel cremeae. Caro alba. Sporae amyloideae, 7.5-10.2 x 7.2-8.75 (-10.0) μm, subglobosae ovatae vel late ellipticae, apiculo conspicuo et nonamyloideo instructae. Basidia clavata, usque 75.9 x 15.4 μm, quadrispora, quoque basidio fibula basali instructo. Cheilocystidia clavata vel ovata usque 19 μm lata, saepe breviter catenulata. Stratum farinaceum pilei ex cellulis globosis ovatis clavatis vel ellipticis et irregulariter dispositis, usque 70 x 60 μm, pro parte majore formatum, cum hyphis sparsis, hyalinis, ramosis, muris tenuibus intermixtis.

Habitat: Dom Dom Saddle, Healesville, Victoria, *coll.* D.A. Reid, 29 May 1976 [Typus].

Amanita peltigera Reid, sp. nov.

Pileus 5.5 cm diam., plano-convexus, in vivo griseus sed superficie (nisi marginem laevem glabrum versus) reliquiis albis peltatis volvae obtectus, in sicco superficie bubalino-coloratus. Stipes usque 5 cm altus, 1 cm latus, basi bulbosa leviter radicanti et hic usque 2.3 cm lata et volva libera alba vaginata. Annulus nullus. Sporae amyloideae (6.5-) 7.5-9.0 x (6.0-) 7.0-7.5 (-8.5) μm subglobosae, ovatae vel latissime ellipticae. Basidia 30-37 x 9-10 μm, clavata, sine fibulis. Reliquiae volvae in pileo praecipue ex hyphis intertextis, 3-12 μm latis, hyalinis, ramosis, saepe varie inflatis sistatae, muris hypharum tenuibus sed distinctis, et sine fibulis, cum cellulis quoque sparsissimis globosis vel ovatis, usque 110 x 90 μm intermixtis.

Habitat: Stirling West, Western Australia, *coll.* J. Randals, March 1976 [Typus].

Amanita pyramidifera Reid, sp. nov.

Pileus 2-3 cm diam., plano-convexus, griseo-bubalinus, verrucis conspicuissimis, acute conicis vel pyramidalibus, usque 5 mm altis instructus. Margo pilei laevis, glaber. Stipes 3.5-6.5 cm altus, 0.6 cm latus, basi bulbosa immarginata et hic usque 1.0 cm latus, infra annulum minute floccoso-lepidotus. Annulus distinctus sed male evolutus, gossypinus, albus. Volva nulla. Lamellae albae. Sporae amyloideae, 8.0-13.5 x 7.0-9.0 μm, obovatae vel ellipticae. Basidia clavata, 58-70 x 11-13 μm, bi-vel quadrispora, quoque basidio fibula basali instructo. Cheilocystidia ovata vel clavata, usque 19 μm lata, saepe breviter catenulata. Verrucae pilei praecipue ex cellulis globosis vel ovatis et irregulariter dispositis, usque 47 μm latis sistentes, cum hyphis sparsis hyalinis ramosis muris tenuibus intermixtis.

Habitat: Eildon, Victoria, *coll.* D.A. Reid & G. Beaton, June 1976 [Typus].

Amanita rosea Reid, sp. nov.

Pileus usque 6.6 cm diam., convexus dein applanatus, centro leviter depressus, cremeus sed marginem versus roseus et maculis intensius roseiis dispersis praesertim peripheriam versus ornatus. Margo laevis, nonunquam reliquiis volvae appendiculatus. Stipes usque 8.5 cm altus, 1.3 cm latus, albus, dimidio inferiore minute luteo-punctatus, sed apicem versus roseo-punctatus; annulus nullus; volva bulbosa, flavida, margine breviter libero ornata. Lamellae cremeae. Caro alba. Sporae (9.5-) 10.2-14.0 (-15.0) x (5.5-) 6.0-6.6 (-7.75) μm, amyloideae, cylindricae. Basidia usque 53.0 x 14.5 μm, quadrispora, sine fibulis. Cheilocystidia breviter catenata, segmento ultimo clavato vel ovato usque 16 μm lato. Reliquiae volvae in pileo ex hyphis abundantibus, hyalinis, ramosis, muris tenuibus, et sine fibulis sistentes; hyphae saepe inflatae et ex segmentis catenularum formatae, segmento ultimo clavato, ovato vel globoso.

Habitat: Darby Saddle, Wilson's Promontory, Victoria, *coll.* D.A., D.G. & P.M. Reid, 8 July 1976 [Typus].

Press Release
National Parks Victoria — New Colour Brochure

An attractive colour brochure describing the 40 areas in Victoria managed by the National Parks Service has just been released.

Produced jointly by the National Parks Service and the Ministry of Tourism, the brochure gives details of the location, features and facilities of these 40 parks. It explains how to get to them, and suggests possible activities.

Five years ago Victoria had 25 areas managed by the National Parks Service, national parks such as Wilsons Promontory and Mount Buffalo. The increase since has been partly the result of Land Conservation Council recommendations, while several areas have been donated to the State through the Victorian Conservation Trust.

The new parks described in the brochure — such as Melba Gully in the Otways, Seawinds and Nepean State Park on the Mornington Peninsula, Discovery Bay Coastal Park and Holey Plains State Park — will be unfamiliar to many people.

The brochure is the first comprehensive guide to all these new areas, although the National Parks Service is at Present producing separate leaflets for each park, as well as nature-trail guides and bird and plant lists.

The new brochure is available free at Victorian Government Tourist Bureaus, or from the National Parks Service head office, district offices and parks.

Three pale-trunked Eucalypts of the Buffalo Plateau

BY MARGERY J. LESTER*

The casual observer tends to assume that the pale-trunked eucalypts about the Chalet at Buffalo are all Snow Gums. Actually there are three different species — Snow Gum *Eucalyptus pauciflora*, Mountain Gum *E.dalrympleana* and Buffalo Sallee *E.mitchelliana*. The last is endemic to the plateau.

Judging by the trunks there is little to distinguish between them. The smooth bark comes off in strips and patches leaving areas of varied colour. The young of all three species often forms mallee-like clumps of slender trunks, but all three species can grow into substantial trees. To distinguish one from the other it is necessary to look at the leaves, buds and fruits (seed capsules).

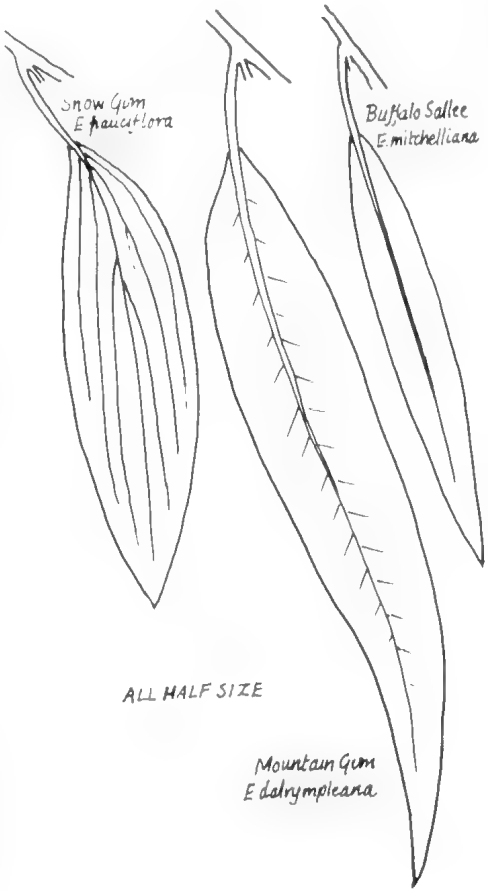
Leaves of the three species

The leaves of Snow Gum are of moderate length 8-12cm (3''-5'') and vary considerably in width. Whatever the leaf width, the veins tend to run down the length of the leaf and the midrib is often no more evident than the other longitudinal veins.

Leaves of Mountain Gum might be anything from 8-20cm long (3''-8'') but are not as variable in width as those of Snow Gum. The central vein is very conspicuous and side veins branch off from it at an angle of about 45°. Sometimes an intra-marginal vein can be seen.

Leaves of Buffalo Sallee are 8-12cm long and much narrower than those of the other two species. The midrib is very comspicuous and is often the only veining that can be seen with the naked eye. Sometimes an intra-marginal vein can be discerned and sloping cross veins (at about 35°) linking it with the midrib. The leaves are dark green rather than bluish-green and glisten in the sunlight.

In January-February 1978 the leaf stalks of Buffalo Sallee and stems extending some 50-60cm back (2ft.) were almost scarlet, but that marked colour is probably of seasonal occurrence.



Simplified drawings of an average leaf of the three species, all half size. These drawings emphasise the main features to look for, but an intra-marginal vein is sometimes noticeable in Mountain Gum and occasionally in Buffalo Sallee.

*4/210 Domain Road, South Yarra

track beyond the Pulpit Rock turn-off.

There are only these four eucalypt species at Buffalo, but as one descends from the plateau other species enter such as Candlebarks, and still further down Peppermints and Manna Gums.

Note concerning Mountain Gum

A doubt exists about the identification of Mountain Gum. Leaves, juvenile foliage, buds and fruits are pretty well identical with those of Candlebark *E. rubida*. It is said that Mountain Gum comes in and Candlebark cuts out at about 1400 metres (4500ft) so the plateau is at an elevation where both species could occur. However, most forestry people consider they are probably all Mountain Gum at Buffalo; identification in the field cannot be certain and would require laboratory examination.

Acknowledgement

I am grateful for permission to examine specimens at the National Herbarium, Melbourne.

REFERENCES

Costermans, L. F. (1977). Trees of Victoria.

Willis, J. H. (1972). Handbook to Plants of Victoria, Vol. 2. Melbourne University Press.

A Black Snake swallowing a Brown Snake

A few days ago when walking through long grass, I came across what appeared to be a snake partly three-quarter black and quarter brown.

After the initial reaction of rapid reverse I realized that it was a black snake swallowing a brown. I gave it a couple of pokes (not strikes) with a stick and after the second it disgorged the brown and took off. The brown snake understandably had his neck out of joint a little at this intrusion on his Sunday, but curiously he was very much alive. Since he was 4ft long and had been consumed to about 1ft I guessed that the process took possibly an hour. Why did he not suffocate?

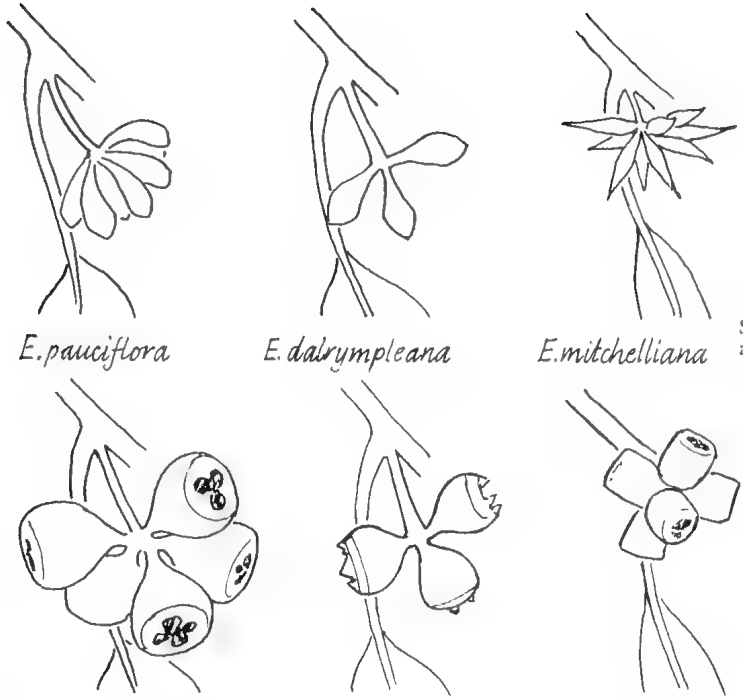
Secondly, how did the black get him into position to swallow? I didn't/couldn't measure the black but he must have been 5ft long and therefore the brown was not far off his own size although thinner in the body and considerably smaller in the head. It is unlikely that black measured brown before selecting him for dinner and possibly, I suggest, that his eyes were to big for his stomach, i.e. he may have been able in ingest, say, 3ft 8in with the last 4in sticking out, presumably leaving him wide open for kookaburra attack unless he could find a safe retreat for 1-2 weeks (another guess).

Blyth Ritchie,
Mountain Creek, N.S.W.

Letter-Winged Kites in South Gippsland

23/5/77. A friend rang us in some excitement to tell us that a party of Letter-winged Kites had appeared at Tarwin Lower. We immediately paid them a visit and found nine birds roosting in coastal manna gum woodland behind the beach dunes. They were easily approached and looked fluffy and torpid, taking flight reluctantly to display the letter pattern beneath the wings. They have been in the district at least a month.

ELLEN LYNDON, Leongatha



Simplified drawings of buds and fruits, all natural size.

Buds and fruits

The buds of Snow Gum are clustered on a stalk 6-12mm long (¼-½''), 8-12 buds per cluster, each bud with a swelling towards the outer end and coming to a blunt apex. The fruits are more or less spherical or pear-shaped up to a centimetre across.

Buds of Mountain Gum occur in threes on a 6-12mm stalk that is slightly flattened. The spherical fruits have protruding valves.

Buds of Buffalo Sallee are clustered on an almost imperceptible stalk, 7-12 buds to each cluster. Each bud has only a slight swelling and comes to a sharp point so that the cluster looks like a ball of spikes. Fruits are small 5-7mm across. Because they are so much more bulky than the slender buds, the fruits completely hide the tiny stalk to the cluster and often the leaf seems to be growing out from the fruits rather than from the stem!

Summary of main identifying features

The active observer is likely to find the three species can be readily distinguished if the following features are kept in mind: the almost parallel-veining of Snow Gum leaves; the three-bud or three-fruit clusters of Mountain Gum; the shiny narrow leaves and spiky bud clusters of Buffalo Sallee. If in doubt, examine other characteristics.

All three species are abundant close to the Chalet, almost equally distributed along the roadway but, behind the Chalet, Buffalo Sallee is predominant. Occurring only on the plateau, this species is certainly not rare and there is almost a pure stand of Buffalo Sallee at the Monolith.

Not a young gum

The abundant, loosely open shrub with the bluish leaves is not a young gum but a wattle — Hickory Wattle *Acacia obliquinervia*. The main vein of the leaf (phyllode) is markedly off-centre.

A fourth eucalypt on the plateau

Another eucalypt that is plentiful at Buffalo is Alpine Ash or Woollybutt *E.delegatensis*. It has rough fibrous bark that continues far up the trunk so cannot be confused with the three gum-barked species. Pure stands of Alpine Ash can be seen along the track to Lake Catani and along the Gorge

Distribution of *Eucalyptus Chapmaniana* (Bogong Gum)

BY PAT CAROLAN*

Eucalyptus chapmaniana was first described in the Victorian Naturalist in 1947[1], when the localities given were: "Pretty Valley Road 2-3 miles above Bogong township, scattered East Kiewa Valley, 7 miles south of Eskdale, Buffalo Road ¼ mile above Mackey's Lookout." Johnson[2] adds Khancoban area, N.S.W. (Byles), Mt. St. Bernard (Maiden) and Wentworth River (Howitt). Recently C. Beulehole collected specimens from Echo Point near Tali Karng and north of Grimmes Saddle about 22 km SW of Mt. Howitt.

This note is to record the existence of *E.chapmaniana* as a common tree in the Woods Point-Gaffneys Creek area, thus considerably extending its range.

At Gaffneys Creek it grows from lowest slopes to top of ridge between Raspberry and Gaffney's Creeks (altitude from about 600-800m) on west side of settlement. Upward extent on east side is not known. Soils on these steep hillsides are usually thin over shales and sandstone of Lower Devonian age.

At Woods Point, where the situation is similar except that drainage, by the Goulburn River, is towards the south-east, *E.chapmaniana* has been collected on hillside above police station and along Matlock Road about 2 km from Woods Point. One minor point worth recording is that some trees have inflorescence of more than three in umbel. This has also been noticed in trees on Big Hill above Mt. Beauty. There are no signs of hybridism in any trees examined.

The vegetation of this area must have been modified considerably by over a century of mining activities and bush fire devastation. However, it is still an interesting area to study variation with elevation and aspect, e.g. *E.viminalis* bordering the creeks, *E.radiata* on lower slopes, *E.regnans* on sheltered south-facing slope, *E.delegatensis* above about 1000m with some *E. dalrympleana*, and *E. pauciflora* on high ridges. There is a surprising patch of almost pure *E. rubida* forest on the BB Spur just west of Matlock at an altitude of about 1200m. *E.chapmaniana* occurs at lower altitudes than most of other reported occurrences of this species but the valleys are frost hollows with low minimum temperatures.

I wish to thank Dr. J. H. Willis for examining specimens.

*1/92 Were St., Brighton, 3186.

1. Vic.Nat. 64, 54, 1947.
2. L. A. S. Johnston, Studies in the Taxonomy of Eucalyptus, Cont. N.S.W. Nat. Herb., 3, 3, 1962.

Survey of Geological Features of the National Estate in Victoria

The Geological Conservation Subcommittee of the Geological Society of Australia (Victorian Division) is conducting a survey of geological features of the National Estate in Victoria, under a grant from the Australian Heritage Commission. The Subcommittee believes that areas and sites of special geological interest are worthy of permanent protection for all or any of the following purposes:

(a) to ensure representation of geological features relevant to the teaching of geology at all educational levels

(b) to preserve geological features which are unique or scientifically important to Australia or parts of Australia

(c) to preserve geological features which are of aesthetic, educational or recreational value to the general public.

People interested in helping this project by submitting listings and documentation of sites of geological interest (especially of endangered areas) should contact Lyal Harris in Room 301, School of Earth Sciences at the University of Melbourne, Parkville 3052, or by telephone on 341 7217.

Aboriginal Material Culture

No. 1 Victorian Wooden Water Vessels

BY A. M. OATES*

The Australian Aborigines, who practised a semi-nomadic hunter/gatherer lifestyle, were able to maintain a delicate balance with their environment. They were able to move freely and relatively unencumbered in their food-quest because they restricted their tool-kit to a few functional and, in some cases, multi-purpose artifacts.

Containers used for food and water varied throughout Australia and included baskets, bags, trays and troughs made from a variety of raw materials such as bark, wood, skin, shell and fibre.

Water containers made from excrescences or gnarls on eucalypts were distributed throughout the eastern third of Australia, ranging from Cape York Peninsula in the north to the Western District of Victoria in the south (Davidson, 1937). The Wurundjeri Aboriginal tribe, who inhabited the Melbourne area, called this type of vessel a **tarnuk** (Fig.1).

Tarnuks were also made from naturally bent tree limbs. The interior of the vessel was gouged out and then smoothed with stone tools until the sides were quite thin. As it was light in weight (the **tarnuk** in Fig.1 weighs only 0.5 kg) it could conveniently be carried over long distances by means of an attached cord of vegetable or animal fibre.

The **tarnuk** drawn in Fig.1 is one of four from Victoria in the National Museum of Victoria ethnographic collections. It was made from the gnarl of a tree and suspended by a length of animal tissue, possibly a portion of the small intestines of a kangaroo or emu. An interesting non-traditional feature of this particular **tarnuk** is a human face carved on the base.

*Assistant Curator In Anthropology, National Museum of Victoria

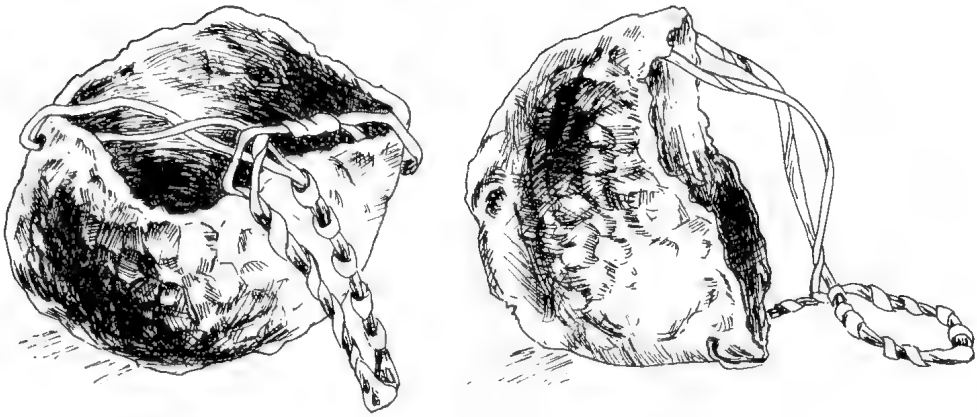
An unusual form of the **tarnuk** acquired by the National Museum of Victoria in 1891 is the **tarnuk bullito** or **tarnuk bullarto** (Fig.2, see also Smyth, 1878, Vol. 1, p. 347, fig. 163) said to have been made by the "Yarra" Aboriginal tribe. This vessel was also modified from a gnarl of a eucalypt but unlike the **tarnuk** proper, is heavy, weighing nearly 7 kg.

Fire was used initially to hollow out the gnarl and burn marks are still clearly visible on the interior of the container. To increase its capacity, most of the burnt wood was gouged out, using steel tools.

The **tarnuk bullito** was too heavy to carry and it was customary for Aborigines to leave them at their various camping places.

Apart from its use as a water vessel, the Aborigines used the **tarnuk bullito** to make a beverage termed *bool* or *beal*. The nectar-bearing cones of Banksia species and the blossoms of some eucalypts were pounded in the container with water to produce the sweet beverage. A similar method of procuring a sweet drink from Grevillea flowers is practised by inland Australian tribes using a shallow, wooden vessel.

Fig. 2. Wooden vessel called **tarnuk bullito** or **tarnuk bullarto** by Victorian Aborigines. (Length: 50 cm). National Museum of Victoria collection, No. X1350.



Legend:
Fig. 1. Wooden vessel called **tarnuk** by Victorian Aborigines. (Length: 20 cm). National Museum of Victoria collection, No. X1527.

Acknowledgements:

I am grateful to J. Cook and D. Stephens, National Museum of Victoria, for supplying the drawings.

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Smyth, R. Brough. (1878). *The Aborigines of Victoria*. Vol. 1, pp. 346-8. Melbourne.

Albury-Wodonga Field Naturalists' Club — affiliated with F.N.C.V.

At an extraordinary General Meeting of F.N.C.V. on 14th November, 1977 Albury-Wodonga was elected an affiliated club. Meetings are held in the Centre for Continuing Education, High Street, Wodonga, on the first Friday of alternate months commencing in February. Excursions are held on the fourth Sunday of every month except December and January, with some additional Saturday trips during the Spring months. President for 1978 is Mr. R. Coghill of Wodonga and Secretary is Mrs. E. Davies, 346 Parkland Drive, Lavington, N.S.W.

Corrections

In the article "Two new species of frogs" by D.S. Liem and G.J. Ingram (Vict. Nat. Vol. 94, Dec., 1977) the following is a list of corrections:—

Page 22:
Title Line 2 read Pelodryadidae
Line 5 read Ingram
Left column Line 2 read *deserticola*

Page 256.
Heading Fig. 1. read *Ranidella deserticola*.

Page 257:
Left column Line 38 read *tinnula*.

Page 258:
Right column: Line 1 read latin not lating
Line 9 read (DSL 5276-80).

Page 261:
Left column Line 27 read expanded
Line 37 read metacarpal
Line 48 read ventro-marginal

Page 262:
Right column Line 18 read *Moreton Island*

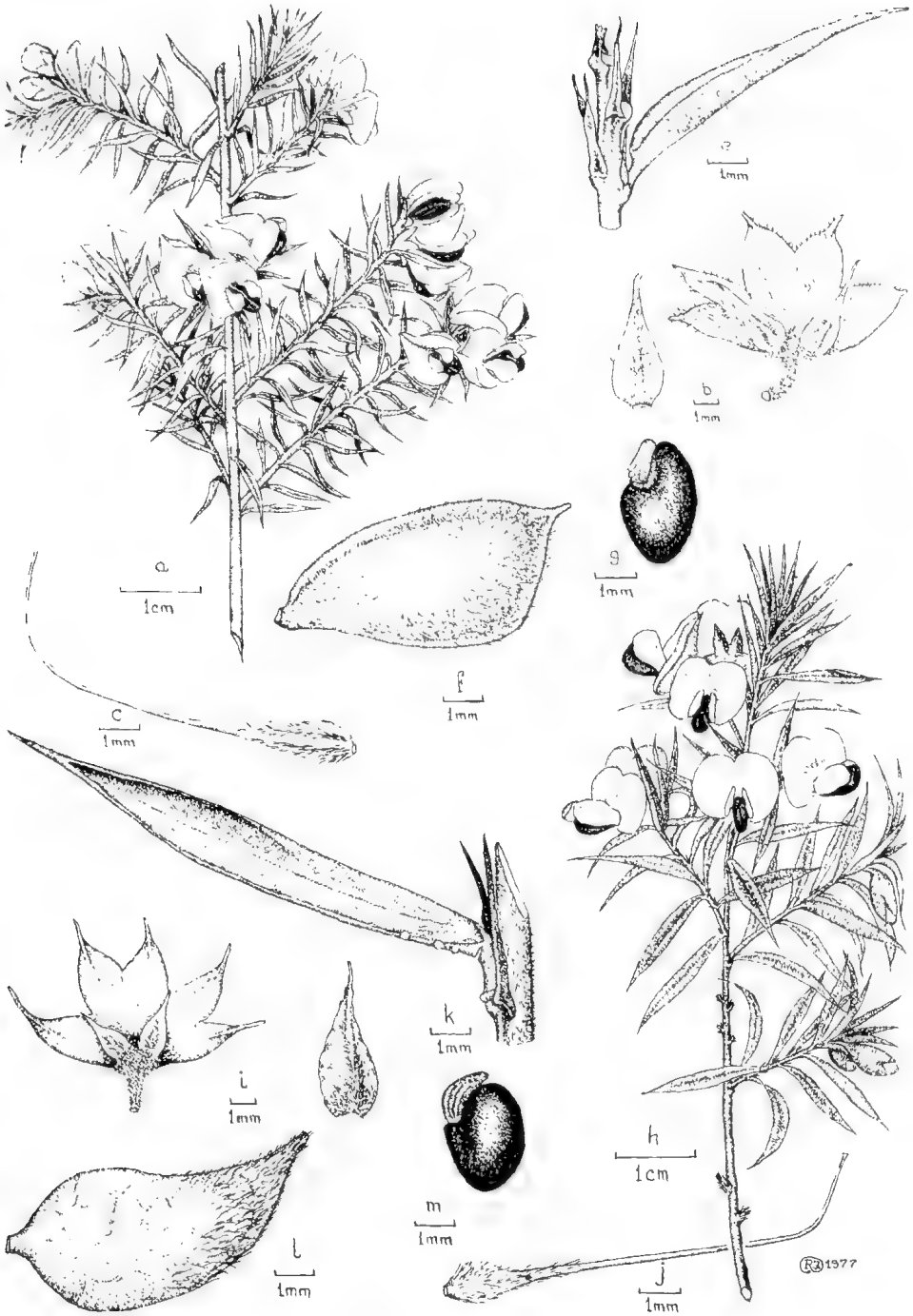

Fig. 11. a-g, *P. juniperina*; a, habit, b. calyx and bracteoles, bracteole drawn a little larger; c, ovary and style; e, leaf and stipules; all from MEL 516833; f, pod; g, seed; from MEL 520601. h-m, *P. juniperina* var. *mucronata*; h, habit; i, calyx and bracteoles, bracteole drawn a little larger; j, ovary and style; k, leaf and stipule, all from MEL 515364; l, pod; m, seed, from MEL 35174.

Bush-peas of Victoria — Genus *Pultenaea* — 9

By M. G. Corrick

Pultenaea juniperina Labill. in Nov. Holl. Plant Specimen 1: 102; t. 130 (1806).

Like the previous species, *Pultenaea juniperina* is found in fairly sheltered, often moist places, mainly in hills and mountain areas, but it is more widespread in Victoria than *P. muelleri* and extends further west to the Grampians and Otways. An isolated occurrence near Portland is believed to have been introduced (A.C. Beauglehole pers. comm. August 1977). It also occurs in New South Wales & Tasmania.

Pultenaea juniperina var. *juniperina* is an open, rather straggly shrub up to 2 m high. The alternate, glabrous, lanceolate leaves are 5-10 mm long with incurved margins; the mid-vein is prominent on the underside and oftens forms a keel. The leaf tapers into a strong, pungent point and the whole plant is very prickly to handle. The stipules are 2-3 mm long, lanceolate, closely appressed to the stem and have a distinct mid-rib.

The flowers, on pedicels 2-3 mm long, are solitary in the leaf axils and often close together towards the tips of the branches. They are generally large, the standard may be as much as 10 mm in height and width. It is a bright yellow-orange with red-brown markings in the throat; the wings are yellow-orange and the keel red-brown.

The calyx is slightly hairy with acute, slender-tipped lobes. The bracteoles are 2-3 mm long; their length in comparison with the calyx is variable but they are usually not longer than the calyx tube. They have a well defined, slightly hairy mid-rib and are attached at the base of the calyx tube. There are no floral bracts below the flowers.

Fig. 11a. Known distribution of *P. juniperina*.

The ovary is covered with short, white, silky hairs and the style is slightly hairy along one side for about a quarter of its length. The pod is pubescent and well exserted from the calyx. Flowering time is early November to mid December; in the Grampians in mid November it is usually at the peak of its flowering by which time other species such as *P. mollis* and *P. scabra* have almost finished. *P. juniperina* var. *mucronata* (Bentham) M. G. Corrick in Muelleria 3(4): 250(1977) has flat, linear leaves up to 30 mm long and 2.5 mm wide with a strong pungent point. They are often darker on the underside, particularly when dry.

The calyx is almost glabrous with ciliate lobes and a few hairs at the base of the tube. The axillary flowers are clustered at the tips of short lateral branches; they are bright yellow-orange slightly tinged with red-brown on the standard and tip of the keel. This variety appears to predominate over most of the range of the species to the east of Melbourne. In many highland areas it is a dominant under-storey species in forests, where plants may be up to 4 m high, making a spectacular sight when in full flower. It also occurs in the Otways but is absent from the Grampians, where the typical form is quite common.

There is a good deal of variation in the length and flatness of the leaves of the var. *mucronata* but they are consistently linear in shape, with the widest part of the leaf in the middle, in contrast to the lanceolate-subulate or cordate leaves of the typical

form. Flowering time of this variety extends from late October to mid December, depending on altitude.

SPECIMENS EXAMINED included: var. *juniperina:* Beside Halls Gap Rd., N. of 1st Wannon Creek, *M. G. Corrick 5722*, 20.xi. 1976 (MEL 516833); Grampians, Mt. William Rd., *M. G. Corrick 5778*, 22.1. 1977 (MEL 516874); var. *mucronata:* 34 km N.E. of Won Wron, *A. H. Corrick*, 5.xi. 1976 (MEL515364); Corryong to Benambra Rd., near Gibbo R. bridge, *M. G. Corrick 6008*, 1.ix.1977 (MEL 520464); E. Gippsland, S. of Tulach Ard nr Gelantipy, *J. H. Willis*, 15.xi. 1968 (MEL 516835).

Pultenaea platyphylla N. A Wakefield in Victorian Naturalist 73:164 (1957).

Pultenaea platyphylla is an uncommon plant apparently restricted to a few scattered localities on granite hills of central and north-eastern Victoria where it is not plentiful. It also occurs in southern New South Wales.

It is a stiff, erect, densely branched shrub 1-1½ m high with angled stems and pale appressed hairs on young growth. The alternate, glabrous, obovate leaves are 8-20 mm long and 3-6 mm wide, with a rounded, obtuse tip and flat margins. In dried specimens the upper surface is usually darker and the mid-vein is prominent on the under surface. The dark brown stipules are 1.5 mm long and closely appressed to the stem.

The flowers are mainly orange and clustered at the tips of the branches. The standard is about 12 mm long and 9 mm wide with dark red-brown markings in the throat. The wings and tip of the keel are also red-brown.

The calyx is about 6 mm long and covered with fine, silky hairs; the two upper lobes are broad and joined almost to the tip. The acute, lanceolate lower lobes are slightly shorter than the calyx tube. The bracteoles are 3-4 mm long, oblanceolate and with a finely serrated tip; they are sometimes covered with silky hairs or the hairs may be restricted to the base and tip. They are attached at, or above the centre of the calyx tube and extend well beyond the tips of the lobes.

The brown, ovate, deciduous bracts are 4-5 mm long, concave, slightly hairy and have ciliate margins. The ovary is densely covered with white appressed hairs and the style is slightly hairy for about 1/5 of its length. The pod is flat and well exserted from the calyx.

There are few records of flowering time and these vary from late September to the end of October.

Pultenaea platyphylla appears to be closely related to *P. retusa*, but it bears a superficial resemblance to some of the smaller-leafed forms of *P. daphnoides* J. Wendl. and was originally known as *P. daphnoides* var. *parviflora* H. B. Williamson.

Records of *P. platyphylla* from western Victoria in Churchill and de Corona (1972) for Grids D & J are apparently based on a very old, undated collection in Melbourne Herbarium, attributed to Mueller. The label lacks details, apart from the single word 'Grampians' added in pencil in different hand-writing. In the absence of more recent, reliable collections this record has been omitted from the accompanying map.

Fig.12a. Known distribution of *P. platyphylla*.
Fig.12b. Known distribution of *P. retusa*.

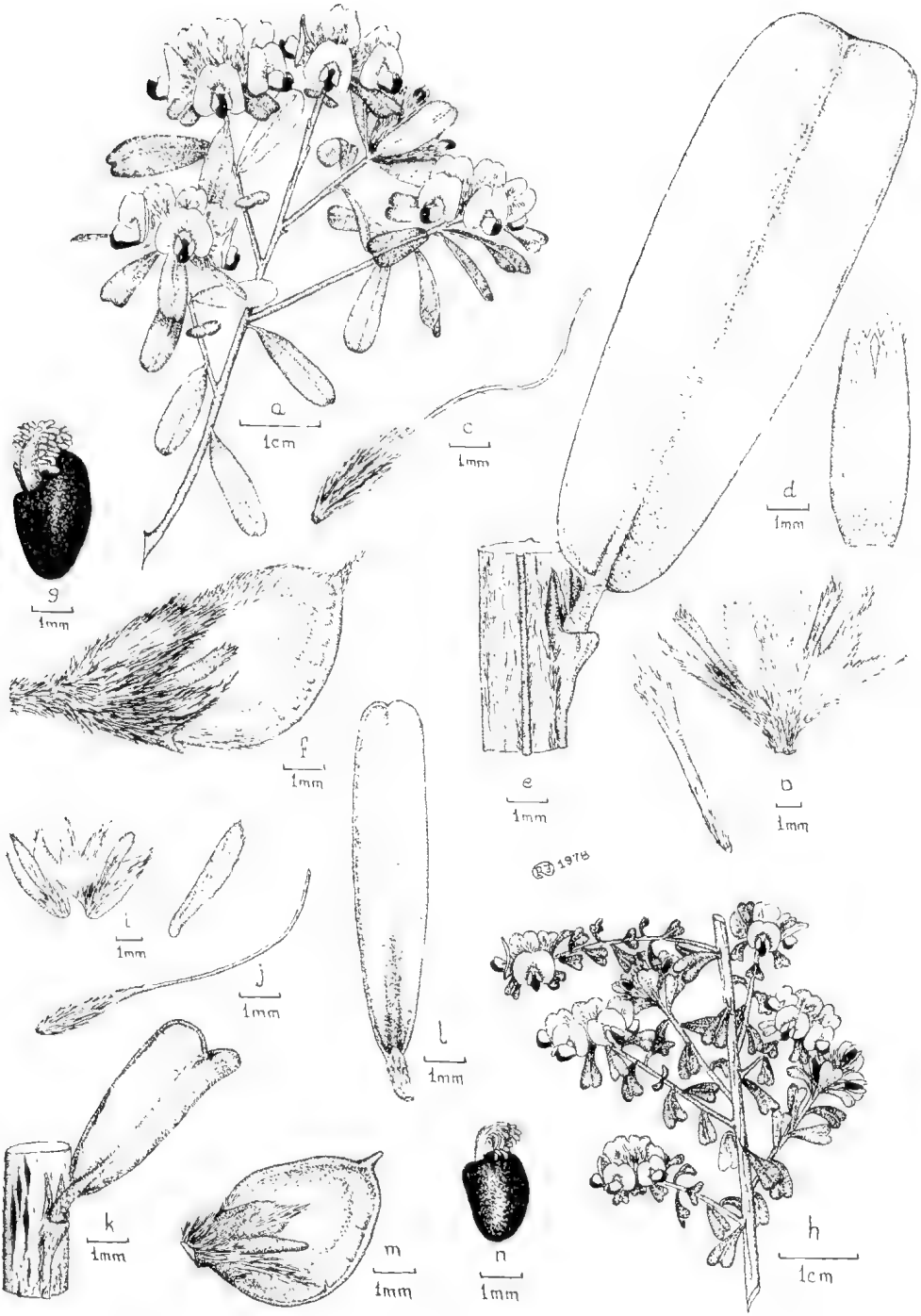

Fig. 12. a-g, *Pultenaea platyphylla*; a, habit from MEL 520044; b, calyx and bracteoles, bracteole drawn a little larger; c, style; d, floral bract all from MEL 35264; e, leaf and stipule from MEL 520044; f, pod; g, seed from MEL 516039. h-n, *Pultenaea retusa*; h, habit; i, calyx and bracteoles, bracteole drawn a little larger; j, style; k, leaf and stipules all from MEL 517321; l, longer leaf form from MEL 520040; m, pod; n, seed from MEL 520036.

SPECIMENS EXAMINED included: Mt. Pilot Reserve, *A. C. Beauglehole 43785*, 8.xii.1973 (MEL 516039); Mt. Tarrengower, *B. A. Fuhrer*, 17.xi.1963 (MEL 520042); Thoona, near Devenish, *F. Morley*, Sept. 1945 (MEL 35264); Warby Range, *Miss D. Nason*, Oct.-Nov. 1959 (MEL 520044); Mt. Tarrengower, *W. C. Tippett*, Oct. 1921 (MEL 17583 — Type); Pine Mt., J. H. Willis, 17.xi.1964 (MEL 520043).

Pultenaea retusa Smith in Annals of Botany 1:502 (1805).

Pultenaea retusa is found in scattered localities of eastern Victoria, south of the Dividing Range and often close to the coast. It also occurs in New South Wales and Queensland. There are two old collections in Melbourne Herbarium from Bendigo area and the Grampians which account for the western Victorian records in Churchill and de Corona (1972) for Grids D & J. In the absence of recent collections or reports of its occurrence in these areas these records have not been included on the accompanying map.

P. retusa was one of the earliest Australian plants to be raised in England and was first described in 1805 from a cultivated plant. It is a small, erect shrub, usually less than a metre high. The stiff, angled branches are usually glabrous, but the very young growth may have some pale, appressed hairs.

The alternate, obovate, glabrous leaves are generally 2-11 mm long and 1-10 mm wide with an obtuse more or less emarginate tip, but the shape and size is very variable. A few collections show very small, cuneate leaves less than 5 mm long. The leaf margins are very slightly recurved and the upper surface is covered with very small black dots which make it appear darker than the lower surface. The mid-vein is prominent on the underside and the latter may also be slightly hairy on young growth. The stipules are about 1 mm long, closely appressed and inconspicuous.

The flowers are orange with red-brown markings on the standard and keel and clustered in small heads at the tips of the branchlets. They are rather small, with the standard about 7 mm high and 4 mm wide. The calyx is 4 mm long and silky with rather long, pale appressed hairs. The lobes are acute and shorter than the tube.

The lanceolate bracteoles are 2-3 mm long, attached above the centre of the calyx tube and extending beyond the lobes. There are usually a few hairs at the base and along the centre of the lower part of the bracteoles.

The papery, deciduous bracts are 2-3 mm long and 1-2 mm broad, with ciliolate margins and a few hairs at the base and sometimes near the tip. They have usually all fallen by the time the flowers are open.

The ovary is thickly covered with white, appressed hairs which cease abruptly just above the base of the style. Flowering time extends from late September to the end of October reaching its peak in mid-October.

P. retusa is very similar, particularly in its longer leaved forms, to *P. platyphylla* but may be distinguished by the much smaller flowers and smaller pod. The leaf tip of *P. retusa* is usually emarginate, sometimes strongly so, whilst *P. platyphylla* almost always has a rounded leaf tip with only occasionally a slight indentation at the end of the mid-vein.

SPECIMENS EXAMINED included: Mallacoota National Park, *A. C. Beauglehole & J. H. Willis ACB 31611A*, (MEL 520038); Gabo Is., *A. C. Beauglehole & J. H. Willis ACB 31547*, 5.xi.1969 (MEL 520037); W Tree Creek, Murrindal, *E. F. Constable 5365*, 30.x.1969 (NSW 78640); Marlo Plains, *Tom Henshall*, 7.vii.1967 (MEL 520040); Grantville, *Colin D. Lewis*, 22.ix.1950 (MEL 517321); East Gippsland, *F. Robbins ACB 3805*, 1937 (MEL 520036).

Comments on the feeding of young marsupials

Please allow me to comment on the article by Elizabeth K. Turner in your May/June, 1977 issue (vol. 94, p. 129) entitled "Preventive Marsupialian Paediatrics".

Dr. Turner stated that young marsupials should never be fed the milk of eutherian mammals (e.g. cow's milk) as they have a deficiency of the enzymes required for the metabolism of galactose, which is present in milk in the form of lactose. This suggestion is based on the work of Stephens *et al.* (1974), who found that the red blood cells of red and grey kangaroos have low levels of activities of two enzymes of galactose metabolism. This finding is not, however, relevant to the question of whether marsupial pouch young can metabolise dietary galactose, since (i) the results were obtained with adult animals, not pouch young, and (ii) dietary galactose would metabolised mainly by the liver, not the red blood cells. To my knowledge there are not as yet any published data on the levels of activities of galactose-metabolising enzymes of the livers of infant marsupials.

Dr. Turner also wrote that marsupial milk does not contain lactose, implying thereby that it contains no galactose. While it is true that marsupial milk contains much less lactose than does the milk of eutherians, quite significant amounts of galactose-containing saccharides have nevertheless been found in the milk of several species of marsupials. This was first demonstrated by Gross and Bolliger (1958, 1959) for the brush possum and confirmed by Jenness *ta al.* (1964) for the quokka, red kangaroo and American opossum. More recent work has shown that milk of the grey kangaroo contains a variety of saccharides of various sizes, in each of which galactose is the predominant monosaccharide (Messer and Mossop, 1977).

Finally, it was stated that young marsupials have low intestinal lactase activity. If this were so, the lactose of cow's milk could not be digested by the animals, and would indeed have a deleterious effect. However, the only published data on the intestinal lactase activity of marsupial pouch young are those of Kerry (1969), who examined one specimen of ring-tail possum and one of grey kangaroo. In both cases the activity was found to be, if anything, higher rather than lower than that found in infant eutherians. The normal function of this enzyme in pouch young is presumably to liberate galactose from the above-mentioned saccharides present in their mother's milk. The high activity of intestinal lactase found in two pouch young indicates that the animals would have no difficulty in digesting the lactose of cow's milk.

In view of these facts, it seems unlikely that the cataracts sometimes seen in young marsupials would be related, causally, to those found in human infants with congenital galactosaemia. In my view the true cause of these cataracts remains to be discovered. Furthermore, the suggestion that orphaned marsupials should be hand-reared on lactose-free milk, such as Glucose Nutramigen, instead of cow's milk (Stephens, 1975), has no scientific basis.

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Natural History Medallion Fund

Donations from persons and organisations wishing to help this Fund will be appreciated and acknowledged.

Amount invested as at 1 March 1978	$506.00
Bird Observers Club of Victoria	50.00
Total	$556.00

Some Records for Battery Island, Tasmania

BY JOHN WHINRAY*

The Furneaux Group is in south-eastern Bass Strait and is the largest Tasmanian group of islands. Battery, which is about 0.2ha in area, is one of the group's smallest islands. It is situated in Armstrong's Channel between Cape Barren and Clarkes Islands. Rocky Head, Battery Bay and Sloping Point shelter it on the northern side. It is less sheltered from the south and south-east and there is no protection from the south-west (see map).

Battery is a granite island and its surface area increases greatly at low tide when more granite is exposed. There is a small sand beach on its northern coast and the sand extends out amongst the northern rocks. At the head of the beach are a small sand blow and a tiny dune. This partly consolidated dune is just higher than the soil surface immediately inland of it. The fine white sand of the beach and dune probably came from the nearby shoal sea bed, rather than from the weathering of the granite. Most of the island is about three metres above high water level but some of the outcrops, including the summit, rise to about six metres.

Matthew Flinders landed on the island in 1798 and his description is the only one I know of. His notes read: "Battery Island; so named for four rocks upon it, resembling mounted guns; sooty petrels, and large hair seals were found there." (Flinders, 1814). Sooty Petrel is an old name for the Tasmanian Muttonbird *Puffinus tenuirostris* (for example, see Montgomery, 1892). Hair Seals were Australian Sea Lions *Neophoca cinerea* (R. M. Warneke, pers. com.).

On 3 May 1976 I steamed close to the southern point of the island and recorded a few birds. It was awkward work as a fresh northerly was blowing waves on the beam of the small partly-open boat. While counting birds I had to steer the boat, watch the waves and watch for rocks. I landed on the island on 5 June 1976 and spent about an hour and a half there. I found no sign of seals and assumed that as the island is so easy to land on, the population was probably wiped out before 1807, in the Bass Strait sealing rush.

Vegetation

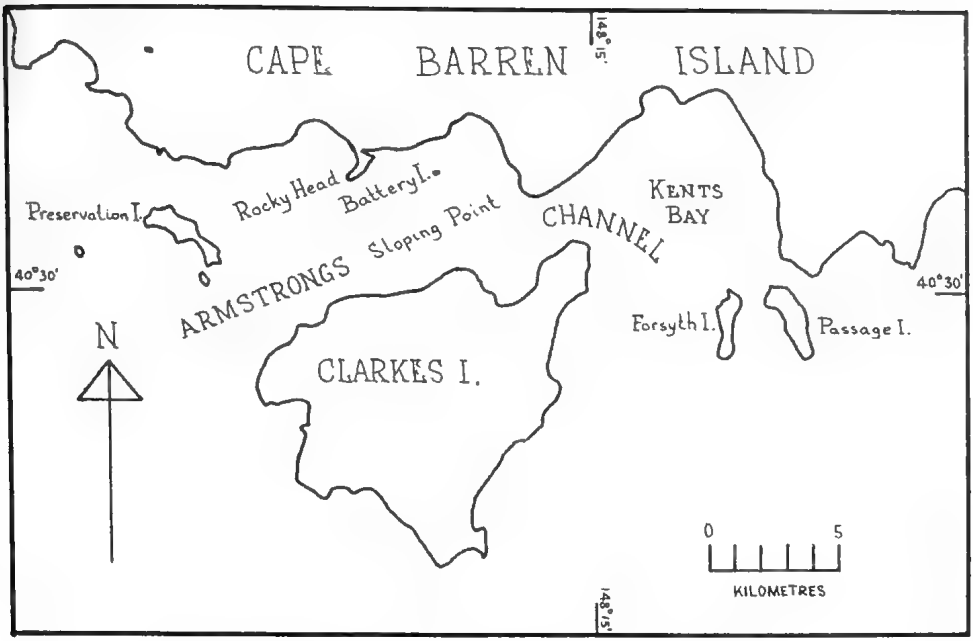
The main dominant plant of the island is Prickly Spear-grass *Stipa teretifolia* which forms tussocks to 1.2m high (see plates one and two). This was the only grass on the island. Its cover varied and I noticed that it formed tussock grassland (30-70% cover) and open-tussock grassland (10-30% cover). Further examination of the island might reveal tiny areas of closed-tussock grassland (70-100% cover). These terms are from Specht (1970).

The ground cover of the island is succulent plants. These plants are dominant in small areas which lack Prickly Spear-grass. Behind the northern beach the only succulent was Bower Spinach *Tetragonia implexicoma*. It formed mats in the open area and also grew amongst the Prickly Spear-grass. Just before the south-eastern point was a small open patch amongst the tussocks. Here were Bower Spinach, Karkalla *Carpobrotus rossii*, Rounded Noonflower *Disphyma blackii*, Leek Lily *Bulbine semibarbata* and two plants of the Sow Thistle **Sonchus oleraceus*. The latter were the only exotic plants observed on the island.

The southern point had Prickly Spear-grass tussocks in the deeper soil areas and in some crevices. Succulents grew amongst them and in the shallower soil. They spread over the rocks, forming a mat of low vegetation (see plate three). The main species were Rounded Noonflower and Karkalla. With them were some Bower Spinach and an occasional clump of Leek Lily.

On the south-western coast there was a tiny beach just south-east of the summit.

*Flinders Island, Tasmania.



Southern portion of the Furneaux Group.

Rounded Noonflower, Beaded Glasswort *Salicornia quinqueflora* and Prickly Spear-grass grew closest to the water's edge. Just inland Karkalla grew with these three species and further inland there were only Bower Spinach and Prickly Spear-grass.

After collecting lichens on the nearby summit, I took no more notes on the vegetation as the weather began to change and it was necessary to leave the island quickly. I recall that Beaded Glasswort grew amongst the Prickly Spear-grass at an elevation of about three metres just east of the summit. Also that Rounded Noonflower was the main species in the succulent coastal mat just north of the summit and there was some Beaded Glasswort growing with it. I do not recall what other species grew in those areas or where the Rounded Noonflower gave way to the Bower Spinach of the northern beach. However there were no as yet unrecorded plants in those two areas.

So Battery Island has only seven plant species. They are:—

Prickly Spear-grass, *Stipa teretifolia*
Leek Lily, *Bulbine semibarbata*
Beaded Glasswort, *Salicornia quinqueflora*
Rounded Noonflower, *Disphyma blackii*
Karkalla, *Carpobrotus rossii*
Bower Spinach, *Tetragonia implexicoma*
Sow Thistle, **Sonchus oleraceus*

No specimens were taken as none of the plants was flowering.

Prickly Spear-grass is a salt tolerant species which forms broken coastal belts around most of the Furneaux Group islands. These belts are widest at places where most salt spray comes in from the sea. The widespread occurrence of this species on Battery Island suggests that salt spray is blown over the entire surface. Both Rounded Noonflower and Beaded Glasswort are succulent, salt tolerant species that occur on the rougher, more exposed coasts of the smaller Furneaux Group islands. Beaded Glasswort is confined to the south-western part of Battery Island and this is the most exposed portion of the island. Rounded Noonflower occurs with it and also on the exposed southern point. With the exception of the Thistle, the other plants are also succulents

Plate One. The northern part of the island, June 1976. About half of the island's vegetation can be seen and the main dominant is Prickly Spear-grass. The sand blow and dune of the northern beach can be seen in the left middleground.

Plate Two. View to the south-east from the summit, June 1976. Prickly Spear-grass is in the foreground and the same species can be seen rising above parts of the succulent mat on portion of the southern point.

able to store water in their leaves. So the vegetation reflects the exposure and small size of the island.

Lichens

I collected four species of crustose lichens on the island's summit outcrop and did not notice any more species above the high water level. The specimens, which have been donated to the National Herbarium, Melbourne, are:—

Caloplaca sublobulata (Nyl.) Zahlbr. (MEL 1018772).

Buellia coniops (Wahlenb. ex Ach.) Th. Fr. (MEL 1018771).

Physcia caesia (Hoffm.) Hampe. (MEL 1018773).

Lecidea sp. (MEL 1018774).

Plate Three. Portion of the southern point, June 1976. A view to the north-east over Prickly Spear-grass and the succulent mat towards tussock grassland. Part of the Battery Bay Hills on Cape Barren Island can be seen in the background.

The first three species are widespread in eastern Bass Strait and also occur outside the area. The fourth species occurs on the forty-seven islands I have visited across eastern Bass Strait from Hogans Group in the north-east to Swan Island in the far south-east. It has yet to be found outside this area.

The small number of species and their size reflect the smallness of the island, its low height and the absence of host shrubs.

Bird list

Little Penguin, *Eudyptula minor*. In June a number of burrows were in use, apparently by this species. I checked one and found two adult birds.

Tasmanian Muttonbird, *Puffinus tenuirostris*, recorded by Flinders in 1798. I noticed burrows that had not been in use for some time and possibly they are of this species which leaves the islands at about the end of April.

Australian Pelican, *Pelecanus conspicillatus*. A flock of thirteen rose in May and eight birds were seen in June.

Black-baced Cormorant, *Phalacrocorax fuscescens*. A flock of about forty, most of which were this species, rose in May. In June forty were counted on the island and the adjacent bared rocks.

Little Pied Cormorant *Phalacrocorax melanoleucos*. Seven were counted on the island and the adjacent bared rocks in June.

Cape Barren Goose *Cereopsis novaehollandiae*. One pair recorded in May.

Sooty Oystercatcher *Haematopus fuliginosus*. A pair was present in June.

Silver Gull *Larus novaehollandiae*. About thirty rose in May and thirteen were counted in June.

Pacific Gull *Larus pacificus*. About ten seen in May. In June there were one immature and three mature birds.

Crested Tern *Sterna bergii*. A flock of twenty-two rose from the north-eastern coast in June.

This is the first published list of Battery Island birds. All but one are species which I would expect to see on small Furneaux Group islands. The exception is the Little Pied Cormorant which is usually closer to the larger islands.

I think that Tasmanian Muttonbirds still breed on the island but a check during the breeding season will be necessary to confirm this. Because of the size of the island, the population could only be small. The Little Penguin numbers must be small for the same reason.

The island is too small to support a pair of Cape Barren Geese but they might breed there. The absence of land birds suggests that the island is too small to support a species.

Slaters and Insects

Some insects and slaters were collected from under a plank on the succulent mat about 20 metres south-east of the summit. These collections have been donated to the Tasmanian Museum, Hobart.

Two of the slater species were Tasmanian endemics, viz. *Cubaris sulcifrons* and *Plymophiloscia ulverstonensis*. I have found the former on a few eastern Bass Strait islands; the latter on many of them. Both also occur on the Tasmanian mainland. The third species is probably in the family Trachelipidae and is undescribed. I have also found this species on many eastern islands and it also occurs on mainland Tasmania.

The insects were a Pseudoscorpion and some Earwigs in the family Labiduridae.

Recommendation

Battery is an attractive islet and is one of the few Furneaux Group islands with a vegetation unmodified by human interference. I think it should become a sanctuary for birds under the control of the National Parks and Wildlife Service.

Acknowledgements

The generous loan of Mr. G. W. G. Goode's boat made the visits to Battery Island possible. Miss A. J. A. Green, of the Tasmanian Museum, determined the slaters and insects. Mr. R. M. Warneke, of the Arthur Rylah Institute for Environmental Research, allowed me to use his opinion of the identity of the Hair Seals.

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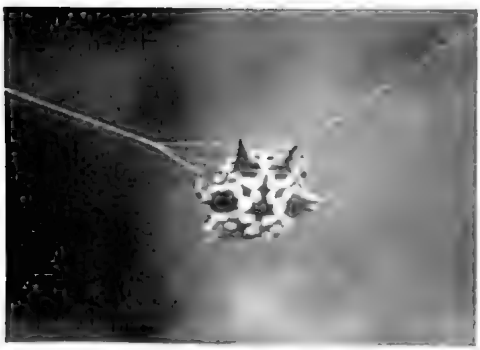
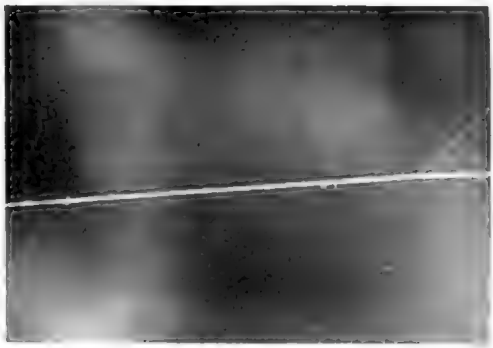
Tufts on Web of Spiny Spider





The orb web of the spiny spider is often built between the branches of small trees and shrubs. Often I have found a series of little tufts of silk (often more or less evenly spaced) attached to some of the radii of the web. Can anyone tell me the purpose of these little tufts?

R.D.K.

Alterations and additions to the vascular flora of Victoria — Part 1.

By A. C. Beaugleholet

Introduction

Since the publication of "A Handbook to Plants in Victoria" by J. H. Willis (1970 & 1972) and "The Distribution of Victorian Plants" by Churchill & de Corona (1972) many additional species have been discovered in the state and there have been a great number of name changes. The name changes have resulted from critical research carried out in many parts of the world. Scientific papers containing information on the Victorian flora appear in a wide variety of periodicals, few of which are available outside specialist libraries. The first part of this paper collates information extracted from these publications and the second part lists species which are additional to those recorded in either or both Willis (1970 & 1972) and Churchill & de Corona (1972).

As I am currently writing up the distribution and conservation of Victorian vascular plants for publication, the up-dating of our flora, for various reasons, is of paramount importance.

The increase in knowledge of the number and range of plant species in Victoria has been due partly to my own work in recording present distribution of plants and also to the excellent response to an appeal for help from field workers,* as well as information received from research workers and others both in and beyond Victoria.

Recording has been done on the grid system of Churchill & de Corona (1972). Since 1972 there have been 6138 additions to the published grid lists, comprising many extensions to the range of known species and including over 100 species not previously recorded as occurring spontaneously in Victoria. Up-dated checklists (unpublished working copies only) have already been provided for a limited number of helpers.

I appreciate that taxonomists are not always in agreement over name changes and that there will be omissions which have escaped me and my many helpers. Criticisms, comments and suggestions to assist in further up-dating would be welcomed.

Acknowledgements

I wish to thank the Directors and staff at Australian and overseas herbaria for their unstinted assistance over many years which has resulted in a greater understanding of our state's flora. In particular the National Herbarium of Victoria for checking and housing voucher specimens of new records.

My thanks also to Dr. R. F. Parsons for encouragement and assistance, particularly for extracts from periodicals and the handling of voucher specimens.

To the many others, too numerous to mention individually, who have supplied many new distribution records and vouchers, a special thank you. I hope that you will continue this splendid work.

Alterations to the vascular flora of Victoria.

The following list is based on the alphabetical arrangement of Churchill & de Corona (1972).

Symbols:
- C Change of name for various reasons. The second name in each case to be used for Victorian records. Note that in some cases the replaced name is still valid but the species does not occur in Victoria. Superseded names are printed in italics.
- S Synonym. The first name is now regarded as a synonym of the second name.
- \+ Additional species now recognised and segregated.
- — Deletion e.g. species now thought to be hybrids, or no longer recognised as distinct at species level; no records of spontaneous occurrence in Victoria etc.

† 3 Beverley Street, Portland, Victoria.

* see Vict. Nat. 93: 159-160(1976) — "A request for additional records".

? Doubt is expressed about the validity of the name or its status at species level or its occurrence in Victoria.

* Species introduced to Victoria.

NSW National Herbarium of New South Wales

References to periodicals appear in the main text; references to books are cited by numbers in italics, full titles appear in the bibliography.

S *Acacia botrycephala* (Vent.) Desf.: **A. terminalis** (Salisb.) Macbride; see Tindale, *Telopea* 1:81-82 (1975)

\+ **Acacia cognata** Domin: plus **A. subporosa** F. Muell., which also occurs in Victoria (Howe Ranges); A.B. Court pers. comm

\+ **Acacia colletioides** Benth.: plus **A. nyssophylla** F. Muell., which sometimes occur together in the Mallee region of N.W. Victoria; E.M. Canning pers. comm.

S *Acacia diffusa* Lindl.: **A genistifolia** Link.; see Court, *Muelleria* 2: 157 (1972).

— Acacia grayana J. H. Willis: Hybrid (A. brachybotrya Benth. X A. calamifolia Sweet ex Lindl.); see *24*:220 (as A. X grayana).

S, — *Acacia paucijuga* F. Muell. ex N. A. Wakefield: **A. deanei** ssp. **paucijuga** (F. Muell. ex N. A. Wakefield) M. D. Tindale; see Tindale, *Contr. N.S.W. natn. Herb.* 4:55-56 (1966).

C *Acacia terminalis (Salisb.) Macbride: ***A. elata** A. Cunn. ex Benth.; see Tindale, *Telopea* 1:81-82 (1975).

\+ **Acaena ovina** A. Cunn.: plus **A. agnipila** Gandoger & **A. echinata** Nees; see *24*:210.

C *Adonis aestivalis L. : ***A. microcarpa** DC.; see P. M. Kloot, *Muelleria* 3:199-207 (1976).

— *Agropogon littoralis (Sm.) C. E. Hubbard; Hybrid (*Polypogon monspeliensis (L.) Desf. X *Agrostis stolonifera L.); see *23*:145 & 148.

C Agropyron pactinatum (Labill.) Pal.: **A. retrofractum** J. W. Vickery; see Vickery, *Contr. N.S.W. natn. Herb.* 1:340-342 (1951).

\+ ***Aira caryophyllea** L.: plus ***A. cupaniana** Guss.; see *10*:584; and ***A. elegans** Willd. ex Gaudin which also occur in Victoria; C. E. Hubbard & B. K. Simon pers. comm.

C *Alhagi camelorum Fisch.: ***A. psuedalhagi** (Bieb.) Desv.; see Ball in *19*:191.

C *Amsinckia hispida (Ruiz & Pav.) I. M. Johnston: ***A. calycina** (Moris) Chater; see Heywood, Bot. J. Linn. Soc, 64:380 (1971).

S *Anthemis nobilis **L.**: ***Chamaemelum nobile** (L.) All.; see *11*:302 and *24*:740.

S, — *Asplenium adiantoides* (L.) Lam.: **A. falcatum** Lam.; see *22*:34.

S *Atriplex billardieri* (Moq.) Hook.f.: **Theleophyton billardieri** (Moq.) Moq.; see *11*:114.

? Atriplex inflata F. Muell. Doubt is expressed that there are genuine occurrences in Victoria; possibly all referable to A. lindleyi Mow.; N.S.W. pers. comm.

S *Bassia sclerolaenoides* (F. Muell.) F. Muell.; **Maireana sclerolaenoides** (F. Muell.) P. G. Wilson; see Wilson, *Nuytsia* 2:18 (1975).

C Bedfordia salicina (Labill.) DC.: **B. arborescens** Hochr.; see Hochreutiner, *Candollea* 5:332 (1934). (B. salicina sens str. is endemic in Tasmania).

C Blechnum aggregatum (Colenso) Tindale: **B. chambersii** M. D. Tindale; see Tindale in *3*:86 and 22:43.

C Blechnum procerum (Forst.f.) Swartz: **B. wattsii** M. D. Tindale; see Tindale, *Contr. N.S.W. natn. Herb.* 3:247 (1963) and 22:42.

› Bossiaea rosmarinifolia Lindl.: B. cinerea R.Br. Doubt is expressed that B. rosmarinifolia should be segregated at species level; NSW pers. comm.

S *Bothriochloa ambigua* S. T. Blake: **B. macra** (Steud.) S. T. Blake; see *23*:436.

\+ **Brachycome aculeata** (Labill.) Lessing: plus **B. scapiformis** DC. Several botanists in Victoria regard these as distinct species. The former many branched, rays white above and mauve below; the latter chiefly single stem, rays wholly blue.

S *Brachycome marginata* Benth.: **B. heterodonta** DC.; see *24*:675.

S **Bromus macrostachys* Desf.:***B. lanceolatus** Roth.; B. K. Simon pers. comm.

S **Bromus mollis* L.: ***B. hordaceus** L.; see P. Smith, *Watsonia* 6:327-344 (1968).

Caladenia tutelata R. S. Rogers: Hybrid (Glossodia major R.Br. X Caladenia deformis R.Br.); see *23*:396.

S *Caleana minor* R. Br.: **Paracaleana minor** (R. Br.) D. F. Blaxell; see Blaxell, *Contr. N.S.W. natn. Herb.* 4:281 (1972).

S, *Caleana sullivanii* (F. Muell.) E. E. Pescott: aberrant form of **P. minor** (R. Br.) D. F. Blaxell; see D. L. Jones, *Orchadian* 5:126 (1977).

S *Calochilus saprophyticus* Rogers: **C. campestris** R.Br.; see D. L. Jones, *Orchadian* 5:83 (1976).

S *Calorophus lateriflorus* (R. Br.) F. Muell.: **Empodisma minus** (Hook.f.) L. A. S. Johnson & Cutler; see Johnson & Cutler, *Kew Bull.* 28:381-385 (1973).

S *Capsella pilosula* (F. Muell.) F. Muell.: **Microlepidium pilosulum** F. Muell.; see E. A. Shaw, *Contr. Gray Herb. Harv.* 205:158 (1974).

S *Cardamine dictyosperma* Hook.: **Rorippa dictyosperma** (Hook.) L. Johnson; see Johnson, *Contr. N.S.W. natn. Herb.* 3:97 (1962).

S *Cardamine laciniata* F. Muell.: **Rorippa laciniata** (F. Muell.) L. Johnson; see Johnson ibid.

S *Cardamine stylosa* DC.: **Rorippa stylosa** (DC.) H. Allan; see *1*:188 and also Johnson *ibid.*

\+ ***Carduus tenuiflorus** Curt.: plus **C. pycnocephalus** Jacq.; see *24*:761-2.

C Celastrus subspicatus Hook.: **C. australis** Harvey & F. Muell.; see Lander & Johnson, *Telopea* 1:33-9 (1975).

C Celmisia longifolia Cass.: **C. asteliifolia** Hook. f.; see *24*:684.

S, + **Cenchrus pauciflorus Benth.*: ***C. incertus** M. A. Curtis; see Twentyman, *Muelleria* 2:164-168 (1972); also Weston, *Nuytsia* 1:379 (1974); plus ***C. echinatus** L. and **C. longispinus** (Hack.) Fern. which also occur in Victoria.

S **Centaurea repens* L.: ***Acroptilon repens** (L.) DC.; see Dostal in *21*:254.

S **Centaurium minus* Garsault: ***C. erythraea** Rafn; see Rafn in *20*:57.

C *Centaurium pulchellum (Swartz) Druce: ***C. tenuiflorum** (Hoffm. et Link) Fitsch; see *3*:421.

S **Centunculus minimus* L.: ***Anagallis minima** (L.) Krause; see Ferguson in *20*:28.

S *Cheiranthera linearis* A. Cunn. ex Lindl.: **C. cyanea** Brongn.; see *11*:165 and *24*:200.

S *Chenopodium atriplicinum* (F. Muell.) F. Muell.: **Scleroblitum atriplicinum** (F. Muell.) Ulbrich; see Ulbrich, *Naturl. PflFam. ed.* 2, 16c:495 (1934).

Chiloglottis pescottiana R. S. Rogers: Hybrid (C.

trapeziformis R. D. FitzG. X C. gunnii Lindl.); D. L. Jones, pers. comm.

S *Chloris acicularis* Lindl.: **Enteropogon acicularis** (Lindl.) Lazarides; see Lazarides, *Aust. J. Bot. Suppl. Ser.* No. 5:31 (1972).

S **Cirsium acarna* (L.) Moench: ***Picnomon acarna** (L.) Cass.; see *11*:328 and *24*:760.

C **Cortaderia selloana* (Schult.) Aschers. & Graebn.: **C. sellowiana** (Schult. f.) Aschers. & Graebn.; see Kerguelen, *Lejeunia* 75:121 (1975).

S *Crassula peduncularis* (Sm.) Meiger: **C. purpurata** (Hook.f.) Domin; see *5*:190.

S **Crocosmia crocosmiflora* (Nichols) N.E.Br.: ***Tritonia crocosmiiflora** Lemoine; see *23*:339.

S *Cuphonotus antipodus* (F. Muell.) J. M. Black: **Ballantinia antipoda** (F. Muell.) E. A. Shaw; see Shaw, *Contr. Gray Herb. Harv.* 205:160-2 (1974).

? Cyathea marcescens N. A. Wakefield: ?Hybrid (C. australis (R.Br.) Domin X C. cunninghamii Hook.f.); see *12*:59.

S *Cyclosorus parasiticus* (L.) Farwell: **Christella dentata** (Forsk.) Brownsey et Jermy; see Holttum, *Kew Bull.* 31:293-339 (1976).

S *Cymodocea antarctica* (Labill.) Sonder & Aschers.: **Amphibolis antarctica** (Labill.) Sonder & Aschers. ex Aschers.; see *2*:302-5.

S *Cyperus aristatus* Rottb.: **C. squarrosus** L.; see Kern, *Flora Malesiana Bull.* Ser. 1, 7:631 (1974).

\+ **Cyperus brevifolius** (Rottb.) Hassk.: plus **C. sphaeroideus** L. A. S. Johnson & O. D. Evans; see Johnson & Evans, *Contr. N.S.W. natn. Herb.* 46:372 (1973).

S *Danthonia paradoxa* R.Br.: **Plinthantesis paradoxa** (R. Br.) S. T. Blake; see Blake, *Contr. Qd. Herb.* 14:3 (1972).

S *Danthonia purpurascens* J. W. Vickery: **D. tenuior** (Steudel) Conert; B. K. Simon pers. comm.

S **Desmazeria acutiflora* (Nees) W. B. Hemsley: ***Plagiocloa acutiflora** (Nees) Adamson & Sprague; B. K. Simon pers. comm.

C Deyeuxia setifolia Hool.f.: **D. affinis** M. Gray; see Gray, *Contr. Herb. Aust.* 26:9 (1976).

S *Dichelachne sciurea* (R.Br.) Hook.: **D. micrantha** (Cav.) Domin; see Veldkamp, *Blumea* 22:9 (1974).

S *Digitaria tenuissima* (Benth.) D. K. Hughes: **D. ramularis** (Trin.) Henrard; see Blake, *Proc. R. Soc. Qd.* 81:18-19 (1969).

\+ **Dillwynia glaberrima** Sm.: plus **D. ramosissima** Benth. which also occurs in Victoria; J. Galbraith pers. comm.

S *Disphyma australe* (Soland.) Black: **D. clavellatum** (Haw.) Chinnock; see Chinnock, *N.Z. J. Bot.* 14:77-8 (1976).

S,– *Diuris brevissima* R. D. FitzG.: **D. maculata** Sm.; D. L. Jones pers. comm.

– Diuris fastidiosa R. S. Rogers: Hybrid (D. palustris Lindl. X D. pedunculata R.Br.) see *23*:361-2.

– Diuris palachila R. S. Rogers: Hybrid (D. maculata Sm. X D. pedunculata R.Br.) see *23*:361 and Jones, *Orchadian* 3:104-106 (1970).

S **Dolichos lignosus* L.: ***Dipogon lignosus** (L.) Verdc.; see Verdcourt, *Taxon* 17:537 (1968).

S *Drimys lanceolata* (Poir.) Baill.: **Tasmannia lanceolata** (Poir.) A. C. Smith; see Smith, *Taxon* 18:287 (1969).

S *Drimys xerophila* Parmentier: **Tasmannia xerophila** (Parmentier) M. Gray; see Gray, *Contr. Herb. Aust.* 26:8 (1976).

S **Elodea densa* (Planch.) Casp.: ***Egeria densa** Planch.; see 2:214.

\+ **Epacris serpyllifolia** R.Br.: plus **E. glacialis** (F. Muell.) M. Gray; see Gray, *Contr. Herb. Aust.* 26:5 (1976).

S *Epilobium adenocaulon* Hausskn.: ***E. ciliatum** Rafin; see *6*:301.

S **Echium lycopsis* L.: ***E. plantagineum** L.; see Piggin, *Muelleria* 3:217 (1977).

S **Eragrostis japonica* (Thunb.) Trin.: ***E. tenellula** (Kunth) Steudel; B. K. Simon pers. comm.

\+ **Eriostemon difformis** A. Cunn. ex Endl.: plus **E. angustifolius** P. G. Wilson; see *24*:333.

S,– *Eucalyptus maidenii* F. Muell.: **E. globulus** Labill. subsp. **maidenii** (F. Muell.) J. B. Kirkpatrick; see Kirkpatrick, *Bot. J. Linn. Soc.* 69:89-104 (1974).

C Eucalyptus pileata Blakely: **E. cyanophylla** Brooker; see Brooker, *Trans. R. Soc. S. Aust.* 101:15-18 (1977).

C Eucalyptus pilularis Sm.: **E. fraxinoides** Deane & Maiden; see *24*:424.

S,– *Eucalyptus pseudoglobulus* Naudin ex Maiden: **E. globulus** Labill. subsp. **pseudoglobulus** (Naudin ex Maiden) J. B. Kirkpatrick; see Kirkpatrick, *Bot. J. Linn. Soc.* 69:89-104 (1974).

S,– *Eucalyptus stjohnii* (R. T. Baker) R. T. Baker: **E. globulus** Labill. subsp. **pseudoglobulus** (Naudin ex Maiden) J. B. Kirkpatrick *ibid.*

S *Eugenia smithii* Poir.: **Acmena smithii** (Poir.) Merr & Perry; see Merrill & Perry, *J. Arnold Arbor.* 19:16 (1938).

S *Euphorbia drummondii* Boiss.: **Chamaesyce drummondii** (Boiss.) D. C. Hassall; see Hassall, Aust. J. Bot. 24:633-640 (1976).

C Euphorbia eremophila A. Cunn.: **E. planiticola** D. C. Hassall; see Hassall, *Aust. J. Bot.* 25:429-453 (1977).

\+ **Eutaxia microphylla** (R.Br.) J. M. Black: plus **E. diffusa** F. Muell.; Several botanists in Victoria regard the latter as a good species. For distinct characters separating the two see *24*:273.

– **Ficus carica* L.: delete from Victorian flora; see comments *24*:29.

C Fimbristylis squarrosus Vahl: **F. velata** R.Br.; see Govindarajalu, *Reinwardtia* 8:509-13 (1974).

S *Gahnia psittacorum* Labill.: **G. grandis** (Labill.) S. T. Blake; see *23*:439.

C Galium parisiense L.:***G. divaricatum** Pourret ex Lam.; see Ehrendorfer in *21*:36.

\+ Galium spp.: plus four other species occurring in Victoria; D. J. McGillivray pers. comm.

S *Gasoul aitonis* (N. J. Jacq.) Hj Eichler: ***Mesembryanthemum aitonis** N. J. Jacq.; see McVaugh, *Taxon* 23:820 (1974).

S *Gasoul crystallinum* (L.) Rothmaler. ***Mesembryanthemum crystallinum** L. See McVaugh *ibid.*

S **Genista linifolia* L.: ***Teline linifolia** (L.) Webb & Berth; see Webb & Berthelot, *Phyt. Canar.* 2:41 (1842) and *24*:284.

S **Genista monspessulana* (L.) L. A. S. Johnson: ***Teline monspessulana** (L.) C. Koch; see Koch, *Dendrologie* 1:30 (1869) and *24*:284.

S *Gleichenia circinnata* Swartz: **G. dicarpa** R.Br.; see Tindale in *3*:50 and 22:59.

\+ **Glyceria australis** C. E. Hubbard: plus ***G. declinata** Breb.; M. Todd pers. comm.

\+ **Gnaphalium argentifolium** N. A. Wakefield: plus **G. fordianum** M. Gray, which is allied to the former; see Gray, *Contr. Herb. Aust.* 26:2 (1976).

C Gnaphalium indicum L.: **G. polycaulon** Pers.; see Grierson, *Notes R. bot. Gdn Edinburgh* 31:135-138 (1971)

\+ **Gnaphalium involucratum** Forst.f.: plus **G. sphaericum** Willd.; see Drury, *N.Z. J. Bot.* 10:112-179 (1972)

C Gnaphalium japonicum Thunb.: **G. gymnocephalum** DC.; see Drury *ibid.*

C Goodenia affinis de Vriese: **G.** sp. aff. **affinis** de Vriese; see *24*:639.

C Gratiola peruviana L.: **G. latifolia** R.Br.; see *5*:326.

C Grevillea bracteata (manuscript name): **G. sp.**; see *24*:40.

C Grevillea flavistyla (manuscript name): **G. willisii** R. V. Smith et D. J. McGillivray; see Smith & McGillivray, *Muelleria* 3:102-111 (1975) and *24* 41.

\+ **Grevillea rosmarinifolia** A. Cunn.: plus **G. glabella** R.Br. see McGillivray, *Telopea* 1:28 (1975).

Grevillea williamsonii F. Muell.: The circumstances indicated by Willis (see *24*:43) suggest that this should not be treated as a good species. Extensive searching by the author failed to locate this plant.

C Hakea vittata R.Br.: **H. tephrosperma** R.Br.; D. J. McGillivray pers. comm.

S, *Haloragis depressa* Walp.: **Gonocarpus micranthus** Thunb.; see *14*:238.

C Haloragis digyna Labill.: Victorian records belong to **H. myriocarpa** Orchard see *14*:132.

S *Haloragis elata* A. Cunn. ex Fenzl.: **Gonocarpus elatus** (A. Cunn ex Fenzl.) Orchard; see *14*:219-224.

Haloragis glauca Lindl.: delete from Victorian flora; see *14*:119-122.

\+ **Haloragis heterophylla** Brongn.: plus **H. aspera** Lindl.; see *14*:110-115.

S *Haloragis meziana* Schindl.: **Gonocarpus mezianus** (Schindl.) Orchard; see *14*:216-219.

S *Haloragis micrantha* (Thunb.) Siebold & Zucc.: **Gonocarpus micranthus** Thunb.; see *14*:238-247.

S *Haloragis racemosa* Labill.: **Haloragodendron bauerlenii** (F. Muell.) Orchard see *14*:143-145.

S, *Haloragis rubra* Schindl.: **Gonocarpus tetragynus** Labill.; see *14*:198-204.

S *Haloragis serpyllifolia* (Hook.f.) Walp.: **Gonocarpus serpyllifolius** Hook.f. see *14*:178-180.

S *Haloragis tetragyna* (Labill.) Hook.f.: **Gonocarpus tetragynus** Labill.; see *14*:198-204.

S, + *Haloragis teucrioides* (DC.) Schlechtendal: **Gonocarpus teucrioides** DC.; see *14*:167-170; **G. humilis** Orchard also occurs in Vic.; see 14:195-198.

S **Hedypnois cretica* (L.) Willd.: ***H. rhagadioloides** (L.) Willd. subsp. **cretica** (L.) Hayek; see *11*:328 and *24*:768.

\+ **Helichrysum bracteatum** (Vent.) Andr.: plus **H. viscosum** Sieber ex Spreng. see *5*:382.

S **Helxine soleirolii* Requien: ***Soleirolia soleirolii** (Req.) Dandy; NSW pers. comm.

S *Hibbertia astrotricha* (Sieber ex Spreng.) N. A. Wakefield: **H. empetrifolia** (DC.) Hoogland; see Hoogland, *Kew Bull.* 29:155 (1974).

S *Hibbertia australis* N. A. Wakefield: **H. stricta** (DC.) F. Muell. see Hoogland *ibid.*

S *Hibiscus farragei* F. Muell.: **Radyera farragei** (F. Muell.) Fryxell & Hashmi; see Fryxell & Hashmi, *Bot Gaz.* 132:57-62(1971).

S **Hordeum hystrix* Roth.: ***H. geniculatum** All.; B.K. Simon and P.S. Cocks pers. comm.

\+ ***Hordeum leporinum** Link.: plus ***H. glaucum** Steud.; see Cocks et al, *Aust. J. Bot.* 24:651-62(1976).

S *Hybanthus filiformis* (DC.) F. Muell.: **H. monopetalus** (Roem. & Schult.) Domin; see *24*:398

\+ **Indigofera australis** Willd.; several botanists agree with Domin that there are two good species involved i.e. **I. signata** (F. Muell.) Domin and **I. australis** Willd. For distinctions see *24*:299.

C Isopogon anemonifolius (Salisb.) Knight: **I. prostratus** D. J. McGillivray; see McGillivray, *Telopea* 1:32 (1975).

— *Juncus acutiflorus Ehrh.: delete, Victorian records belong to other species; L. A. S. Johnson pers. comm.

— *Juncus fockei* Buch.: now included under **J. holoschoenus** R.Br.; L. A. S. Johnson pers. comm.

C Juncus maritimus Lam.: Victorian records belong to **J. Kraussii** Hochst.; L. A. S. Johnson pers. comm.

C Juncus pusillus Buch.: **J. sandwithii** Lourteig; L. A. S. Johnson pers. comm.

\+ Juncus spp.: plus numerous other species; L. A. S. Johnson pers. comm.

— *Kickxia commutata (Bernh. ex Reichnb.) Fritsch.: delete as there is no Victorian record.

? *Kickxia spp.: To establish identity and distribution of species within Victoria all collections will need to be checked.

S *Kochia aphylla* R.Br.: **Maireana aphylla** (R.Br.) P. G. Wilson; see Wilson, *Nuytsia* 2 (1) 1975.

S *Kochia brevifolia* R.Br.: **Maireana brevifolia** (R.Br.) P. G. Wilson; see Wilson *ibid.*

S *Kochia cheelii* Anders.: **Maireana cheelii** (Anders.) P. G. Wilson; see Wilson *ibid.*

S *Kochia crassiloba* Anders.: **Maireana enchylaenoides** (F. Muell.) P. G. Wilson; see Wilson *ibid.*

S Kochia erioclada (Benth.) Gauba: **Maireana erioclada** (Benth.) P. G. Wilson; see Wilson *ibid.*

S, + *Kochia excavata* J. M. Black: **Maireana excavata** (J. M. Black) P. G. Wilson; plus **Maireana trichoptera** (Black) P. G. Wilson; see

C Wilson *ibid.*

Maireana turbinata P. G. Wilson see Wilson *ibid.*

S *Kochia humillima* F. Muell.: **Maireana humillima** (F. Muell.) P. G. Wilson; see Wilson *ibid.*

S *Kochia oppositifolia* F. Muell.: **Maireana oppositifolia** (F. Muell.) P. G. Wilson; see Wilson *ibid.*

S *Kochia pentagona* Anders.: **Maireana pentagona** (Anders.) P. G. Wilson; see Wilson *ibid.*

S *Kochia pentatropis* Tate: **Maireana pentatropis** (Tate) P. G. Wilson; see Wilson *ibid.*

S *Kochia pyramidata* Benth.: **Maireana pyramidata** (Benth.) P. G. Wilson; see Wilson *ibid.*

S *Kochia radiata* P. G. Wilson: **Maireana radiata** (P. G. Wilson) P. G. Wilson; see Wilson *ibid.*

S *Kochia rohrlachii* P. G. Wilson: **Maireana rohrlachii** (P. G. Wilson) P. G. Wilson: see Wilson *ibid.*

S *Kochia sedifolia* F. Muell.: **Maireana sedifolia** (F. Muell.) P. G. Wilson; see Wilson *ibid.*

C Kochia tomentosa F. Muell.: **Maireana appressa** (Benth.) P. G. Wilson; see Wilson *ibid.*

S,— *Kochia villosa* Lindl.: **Maireana villosa** (Lindl.)

P. G. Wilson; delete from Victorian flora; see Wilson *ibid.*

S **Koeleria phleoides* (Vill.) Pers.: ***Lophochloa phleoides** (Vill.) Reichenb.; B. K. Simon pers. comm.

S *Kunzea muelleri* Benth. **K. ericifolia** F. Muell.; see Mueller, *Trans Proc. Vic. Inst. Advmt. Sci.*: 123(1855).

C Lagenophora spp.: spelling now **Lagenifera**; see *Taxon* 17:327(1968)

\+ **Lagenifera stipitata** (Labill.) Druce: plus **L. montana** Hook.f.; the latter also bears some resemblance to **L. gracilis** Steetz but has different root system etc. (author's observation).

S *Lasiopetalum dasyphyllum* Sieber ex Hook.f.: **L. macrophyllum** Grah.; A. N. Rodd pers. comm.

S *Lastreopis shepherdii* (Kunze ex Mett.) M. D. Tindale; **L. acuminata** (Houlston) Morton; see Morton, *Contr. U.S. natn. Herb.* 38:246(1973).

S *Lemna oligorrhiza* Kurz: **Spirodela oligorrhiza** (Kurz) Hegelm.; see 2: 253.

S *Lemna polyrhiza* L.: **Spirodela polyrhiza** (L.) Schleiden; see *2*:254.

? S —Lepidium dubium Thell.: apparently conspecific with **L. aschersonii**; see *24*:175.

S *Leptoceras fimbriatum* Lindl.: **Leporella fimbriata** (Lindl.) A. S. George; see George, *Nuytsia* 1:183(1971).

\+ *Leptospermum laevigatum* (J. Gaertn.) F. Muell.: some botanists regard the Mallee populations as a separate species, i.e. **L. coriaceum** (F. Muell. ex Miq., ut Fabricia sp.) Cheel.

S *Libertia pulchella* (R.Br.) Spreng.: **Sisyrinchium pulchellum** (R.Br.) F. Muell.; see Geerinck, *Bull. Jard. Bot. Nat. Belg.* 44:29-60(1974).

S *Lindsaea cuneata* (Forst.f.) C. Chr.: **Lindsaea trichomanoides** Dryand; see Tindale in *3*:29 and *22*:29.

S **Lithospermum arvense* L.: **Buglossoides arvense** (L.) I. M. Johnston; see Johnston, *J. Arnold Arbor.* 35:42(1954).

S *Loudonia behrii* Schlechtendal: **Glischrocaryon behrii** (Schlecht.) Orchard; see *14*:160-163.

— *****Lupinus hirsutus L.: this name has been confused with at least three other species (NSW pers. comm.); as indicated in *24*:285 this is best omitted from the Victorian flora.

\+ Luzula campestris (L.) Dc.: Luzula species, 10 of which occur in Victoria; see Edgar, *N.Z. J. Bot.* 13:781-802(1975) and E. Edgar pers. comm.

S *Machaerina acuta* (Labill.) J. H. Kern: **Baumea acuta** (Labill.) Palla; see *23*:438.

S *Machaerina articulata* (R.Br.) Koyama: **Baumea articulata** (R.Br.) S. T. Blake; see *23*:438.

S Machaerina gunnii (Hook.f.) J. H. Kern: **Baumea gunnii** (hook.f.) S. T. Blake; see 23: 438.

S *Machaerina juncea* (R.Br.) Koyama: **Baumea juncea** (R.Br.) Palla; see *23*:438.

S *Machaerina laxa* (Nees) Koyama: **Baumea laxa** (Nees) Boeck.; see *23*:438.

S *Machaerina rubiginosa* (Spreng.) Koyama: **Baumea rubiginosa** (Spreng.) Boeck.; see *23*:438.

C Machaerina teretifolia (R.Br.) Koyama: **Baumea** sp. Victorian plant is not B. teretifolia (Labill.) S. T. Blake; NSW pers. comm.

C *****Malus sylvestris (L. Mill.: ***M. X domestica** Borkh. The latter is the correct name for the common eating apple in all its varieties. M. sylvestris is the European wild apple which is probably virtually unknown in Australia; NSW pers. comm.

S *Marianthus procumbens* (Hook.) Benth: **Rhytidosporum procumbens** (Hook.) F. Muell.; see McGillivray, *Telopea* 1:55 (1975).

S *Mecodium australe* (Willd.) Copeland: Hymenophyllum australe Willd.; see Tindale, *Contr. N.S.W. natn. Herb. Flora Ser.* 210: 26 (1963) and 22: 6.

S,— *Mecodium dilatatum* (Forst. f.) Copeland: **Hymenophyllum dilatatum** (Forst. f.) Sw.; delete from Victorian flora; see 22: 5.

S *Mecodium flabellatum* (Labill.) Copeland: **Hymenophyllum flabellatum** Labill.; see Tindale, *Contr. N.S.W. natn. Herb. Flora Ser.* 210: 24 (1963) and 22: 6.

S *Mecodium rarum* (R.Br.) Copeland: **Hymenophyllum rarum** R.Br.; see Tindale *ibid* and 22: 5.

\+ **Melaleuca ericifolia** Sm.: plus? **M. ternifolia** F. Muell. ex Miq. see notes in 24: 455.

S, *Microtis biloba* W.H. Nicholls: **M. unifolia** (Forst. f.) Reichenb.; see Jones *Orchadian* 5: 84 (1976).

S,— *Microtis bipulvinaris* W.H. Nicholls: **M. parviflora** R.Br.; see Jones *ibid.*

S,— *Microtis holmesii* W.H. Nicholls: **M. parviflora** R.Br.; see Jones *ibid.*

S *Montia australasica* (Hook. f.) Pax & Hoffm.: **Neopaxia australasica** (Hook. f.) Nilss.; see Nilsson, *Bot. Notiser* 119: 469 (1966).

S *****Myriophyllum brasiliense* Cambess.: ***M. aquaticum** (Vell.) Verdc.; see Verdcourt, *Kew Bull.* 28: 36 (1973).

C, + *Nasturtium officinale R.Br.: ***Rorippa nasturtium-aquaticum** (L.) Hayek.; see 3: 164; Note: in 19: 284 Nasturtium is kept as a distinct genus.
***Rorippa microphylla** (Boenningh. ex. Reichb.) Hylander ex A. & D. Love (syn. **Nasturtium microphyllum* (Boenningh. ex Reichb.) Hylander ex A. & D. Love) also occurs in Victoria; see 2:69 and 24:182-183 under latter name.

C Nitraria schoberi L.: **N. billardieri** DC.; see Chevalier, *Rev. Bot. Appl.* Nov.-Dec. 1949:595.

S *Olearia dentata* (Andr.) Moench: **O. tomentosa** (J.C. Wendl.) D.C.; see Rickett & Stafleu, *Taxon* 9: 124 (1960).

— Olearia stellulata (Labill.) DC.: the Mt. Clay record is a misidentification, the species must be deleted from the Victorian flora.

\+ **Oplismenus aemulus** (R.Br.) Kunth: plus **O. imbecilis** (R.Br.) Reichenb.; both occur in Victoria; see Vickery, *Flora of N.S.W.* (19) Pt. 2: 215-218 (1975).

— *****Oxalis tetraphylla Cav.: delete from Victorian flora; see 24: 322.

S *Panicum fulgidum* Hughes: **P. simile** Domin; see 23: 435.

C *****Paronychia chilensis DC.: Victorian records belong to ***P. franciscana** Eastwood; see Aston, *Muelleria* 3: 209-214 (1977).

\+ **Paspalidium gracile** (R.Br.) D.K. Hughes: plus **P. constrictum** (Domin) C.E. Hubbard; see Vickery, *Flora N.S.W.* (19) Pt. 2: 145 (1975).

S *Paspalum distichum* L.: **P. paspalodes** (Michx.) Scribn.; see Vickery, *Flora N.S.W.* (19) Suppl. to Pt. 1: 135 (1975).

S,— *Patersonia longifolia* R.Br.: **P.sericea** R.Br.; see Geerinck, *Bull. Jard. Bot. Nat. Belg.* 44: 29-60 (1974).

S *Patersonia longiscapa* Sims ex Sw.: **P. occidentalis** R.Br.; see Geerinck *ibid.*

S *****Pennisetum compressum* R.Br.: ***P.**

alopecuroides R.Br.; see Vickery, *Flora of N.S.W.* (19) Pt. 2: 251 (1975). Apparently introduced into Victoria; see 23: 203.

C Persoonia brevifolia (manuscript name): ? **P. myrtilloides** Sieber ex Schult. & Schult. f. var. brevifolia Benth., see 24:35
Persoonia lucida R. Br.: Hybrid (P. levis (Cav.) Domin X P. linearis Andr.); see 24: 36.

S,— *Phebalium ovatifolium* sens Ewart *Flor. Vict.* 709 (1931) non F. Muell. in *Trans. Philos. Soc. Victoria* 1: 99 (1855): **P. squameum** (Labill.) Engl. subsp **coriaceum** P.G. Wilson; see Wilson, *Nuytsia* 1: 95 (1970).

S, *Phebalium ozothamnoides* F. Muell.: **P. squamulosum** Vent. subsp. **ozothamnoides** (F. Muell.) P.G. Wilson; see Wilson *ibid.*

C Phlegmatospermum cochlearinum (F. Muell.) O.E. Schulz.: **P. eremaeum** (J.M. Black) E. Shaw; see Shaw, *Contr. Gray Herb. Harv.* 205: 151 (1974).

S *Phragmites communis* Trin.: **P. australis** (Cav.) Trin. ex Steud.; see Clayton, *Taxon* 17: 168 (1968).

S **Picris echioides* L.: ***Helminotheca echioides** (L.) Holub; see Holub, *Fol. Geobot. & Phytotax* 8: 176 (1973).

S, *Pimelea collina* R.Br.: **P. linifolia** Sm.; see 24: 406

S,— *Pimelea micrantha* R.Br.: **P. curviflora** R.Br.; the former is only a reduced Mallee form of the latter.

\+ Plantago spp.: plus several other species; see Briggs et al, *Contr. N.S.W. natn. Herb.* 4: 395-398 (1973) and Briggs et al *Flora of N.S.W.* 181: 1-35 (1977).

C Plantago tasmanica Hook. f.: Victorian records belong to **P. alpestris** Briggs, Carolin & Pulley. See *Contr. N.S.W. natn. Herb.* 4: 395 (1973).

\+ Poa australis R.Br.: plus numerous other species; see Vickery, *Contr. N.S.W. natn. Herb.* 4: 145-243 (1970).

S *Podosperma angustifolium* Labill.: **Podotheca angustifolia** (Labill.) Lessing; see *Taxon* 16: 229 (1967).

C Polygonum minus Huds.: **P. decipiens** R.Br.; see 3: 185.

\+ Pomaderris velutina J.H. Willis: plus another apparently undescribed species.

— Potamogeton cheesemanii A. Benn.: Australian records probably belong to **P. tricarinatus** F. Muell. & A. Benn. ex A. Benn.; see 2: 288.

S,— *Potamogeton sulcatus* A. Benn.: **P. tricarinatus** F. Muell. & A. Benn. ex A. Benn.; see 2: 288.

S **Poterium polygamum* Waldst. & Kitaib.: ***Sanguisorba minor** Scop. subsp. **muricata** Briq.; see Proctor & Nordloorg in 19:34.

S,— *Prasophyllum colemaniae* R. S. Rogers: **P. odoratum** R. S. Rogers; see Jones, *Orchadian* 5: 84-85 (1976).

S *Prasophyllum fuscoviride* F.M. Reader: **P. nigricans** R.Br.; see George, *Nuytsia* 1: 187 (1971).

C Prasophyllum nigricans R.Br.: **P. sp.** The plant previously known as P. nigricans must be known only as **P. sp.** until its status (or identity) is determined.

\+ **Pratia purpurascens** (R.Br.) F.E. Wimmer: plus another species; see 24: 631.

\+ Prostanthera spp.: plus several other species; J. Carrick pers. comm.

— Prostanthera sp. (Cultivation Creek, Grampians): almost certainly a hybrid (P. lasianthos Labill. X P. spinosa F. Muell.). Apparently P. lasianthos Labill. has also hybridised with P. hirtula F. Muell. ex Benth. (Fyans Ck, Grampians) and with P. cuneata Benth. (Baw Baws).

— Pterostylis acuminata R.Br.: Victorian records belong to P. X ingens (H.M.R. Rupp) D.L. Jones. (This is a hybrid between P. falcata R.S. Rogers and P. nutans R.Br.); see Jones, *Orchadian*, 5: 54 (1976)

C Pterostylis barbata Lindl.: Victorian records belong to **P. plumosa** L. Cady; see 23: 450.

S, *Pterostylis celans* H.M.R. Rupp: aberrant form of **P. nana** R.Br.; see Jones, *Orchadian* 5: 128 (1977).

S,— *Pterostylis crypta* W.H. Nicholls; aberrant form of **P. obtusa** R.Br.; see Jones *Orchadian* 5: 127 (1977).

C Pterostylis pusilla R.S. Rogers: **P. rufa** R.Br.; see 23: 450.

C Pterostylis rufa R.Br.: **P. biseta** J.A.P. Blackmore & S.C. Clemesha; see 23: 450.

C Pterostylis squamata R.Br.: **P. hamata** J.A.P. Blackmore & S.C. Clemesha; see 23: 451.
Pterostylis toveyana Ewart & Sharman: Hybrid (P. alata (Labill.) Reichenb. f. X P. concinna R.Br.); see 23: 402.

? Pultenaea maidenii F.M. Reader; Apparently a hybrid between P. benthamii F. Muell. & P. scabra R.Br. The author has seen both parents, as well as intermediates on several occasions, in quite separate colonies.

\+ Ranunculus spp.; plus **R. scapiger** Hook. and **R. victoriensis** B.G. Briggs; see Briggs, *Proc. Linn. Soc. N.S.W.* 84: 295-324 (1959).

\+ ***Romulea longifolia** (Salisb.) Baker: plus ***R. minutiflora** Klatt; see 11: 87.

\- *Rubus scabripes Genevier: not recorded for Victoria.

S **Rumex acetosella* L.: ***Acetosella vulgaris** Fourr.; see Johnson & Briggs, *Contr. N.S.W. natn. Herb.* 3: 166 (1962).

S **Rumex sagittatus* Thunb.: ***Acetosa sagittata** (Thunb.) Johnson & Briggs; see Johnson & Briggs, *Contr. N.S.W. natn. Herb.* 3: 166 (1962).

S *Rumex vesicarius* L.: ***Acetosa vesicaria** (L.) A. Love; see Johnson & Briggs *ibid.*

S **Sarothamnus scoparius* (L.) Wimmer ex W. Koch: ***Cytisus scoparius** (L.) Link; see Frodin & Heywood in 19: 89.

C Scirpus americanus Pers.: **S. pungens** Vahl; see Schuyler, *Rhodora* 76: 51-2 (1974).

C Scirpus antarcticus L.: **S. marginatus** (Thunb.) J. Raynal; see Raynal, *Adansonia* 14: 212 (1974) (where treated as a species of Isolepis).

S *Scirpus calocarpus* S.T. Blake: **S. hookeranus** (Boeck.) S.T. Blake; see Blake, *Contr. Qd. Herb.* 8: 19 (1969).

C Scirpus fluviatilis (Torr.) A. Gray: **S. medianus** V.J. Cook; see Cook, *Trans. R. Soc. N.Z.* 76: 569 (1947).

S **Scirpus hamulosus* (Bieb.) Steven: ***Cyperus hamulosus** Bieb.; see Blake, *Trans. R. Soc. S. Aust.* 67: 55 (1943).

C Scirpus lateriflorus J.F. Gmel: **S. erectus** Poir.; see Blake, *Contr. Qd. Herb.* 8: 15 (1969).

C Scirpus maritimus L.: **S. caldwellii** V.J. Cook; see Cook, *Trans. R. Soc. N.Z.* 76: 568 (1947).

S *Scirpus merrillii* (Palla) Kukenth. ex. Merrill: **S. subtillissimus** (Boeck.) S.T. Blake; see Blake, *Contr. Qd. Herb.* 8: 20 (1969) and 23: 436.

S **Scorzonera laciniata* L.: ***Podospermum laciniatum** (L.) DC.; see 11: 329 & 24: 771.

S *Seseli harveyanum* F. Muell.: **Gingidia harveyana** (F. Muell.) Dawson; see Dawson, *Contr. Herb. Aust.* 23: 1: (1976).

C Sicyos angulata L.: **S. australis Endl.**; see Cogniaux in 6: 875.

S **Sieglingia decumbens* (L.) Bernh.: ***Danthonia decumbens** DC. B.K. Simon pers. comm.

C *Solanum douglasii Dunal: ***S. furcatum** Dunal; see Henderson, *Contr. Qd. Herb.* 16: 58 (1974).

— Solanum eremophilum F. Muell.: not recorded for Victoria.

+ **Solanum simile** F. Muell.: plus **S. linearifolium** I.I. Herasimenko; see 24: 550.

S *Solanum violaceum* R.Br.: **S. brownii** Dun. (Robert Brown's name is illegitimate, being predated by S. violaceum Jacq. which is a different species); D.E. Symon pers. comm.

— *Solidago canadensis L.: not recorded for Victoria.

S *Sparganium ramosum*: **S. erectum** L.; see 2: 296.

S *Spiculaea huntiana* (F. Muell.) Schltr.: **Arthrochilus huntianus** (F. Muell.) D. Blaxell; see Blaxell, *Contr. N.S.W. natn. Herb.* 4: 277 (1972).

+ Stipa spp: plus several other species; J.W. Vickery pers. comm.

— Stylidium despectum R.Br.: Best omitted from Victorian flora. The author, J.H. Willis and many others have never seen this species within the state.

— Stylidium lineare Swartz ex Willd.: delete from Victorian flora; see 24: 647.

+ **Tetrarrhena distichophylla** (Labill.) R.Br.: plus an apparently undescribed species; see 24: 91.

C Tetratheca ericifolia Sm.: **T. bauerifolia** F. Muell. ex. Schuchardt; see Thompson, *Telopea* 1: 196 (1976).

C Tetratheca glandulosa Labill.: **T. labillardieri** J. Thompson; see Thompson, *Telopea* 1: 189 (1976).

C Thelymitra aristata Lindl.: ? **T. megcalyptra** R.D. FitzG.; see T. grandiflora FitzG. below.

S *Thelymitra azurea* Rogers: **T. canaliculata** R.Br.; see George, *Nuytsia* 1: 194 (1971).

— Thelymitra cyanea (Lindl.) Benth.: Apparently Victorian records are a hybrid or an aberrant form. Whichever is the case, T. venosa R.Br. is involved.

S *Thelymitra grandiflora* FitzG.: **T. aristata** Lindl.; see George, *Nuytsia* 1: 193 (1971).

— Thelymitra irregularis W.H. Nicholls: The author, having studied this plant in the field on several occasions is convinced that it is a hybrid viz. T. ixioides Swartz X T. rubra R.D. FitzG. In all cases both parents were present.

S,— *Thelymitra murdochae* W.H. Nicholls: Aberrant form of **T. aristata** Lindl. (formerly T. grandiflora FitzG.); see Jones, *Orchadian* 5: 128 (1977).

+ **Thelymitra pauciflora** R.Br.: the author has critically examined numerous flowers from colonies over a wide area and there is no question that two species are involved — the other being **T. holmesii** W.H. Nicholls. Not once were any intermediates ever seen, even when growing together in thousands.

S *Thrixspermum tridentatum* (Lindl.) T.E. Hunt: **Plectorrhiza tridentata** (Lindl.) A.W. Dockrill; see 23: 451.

S,— *Tieghemopanax multifidus* N.A. Wakefield: **T. sambucifolius** (Sieb. ex DC.) Viguier. The author has found no distinction within the flower and fruit make up. There is no clear distinction within the leaf structure, some colonies have every gradation. It is considered that the former should be a synonym of the latter.
Note: for name Tieghemopanax Viguier see below.

S *Tieghemopanax sambucifolius* (Sieb. ex DC.) Viguier: **Polyscias sambucifolia** (Sieber ex DC.) Harms; see 3: 391.

S **Trisetum pumilum* (Desf.) Kunth.: ***Lophochloa pumila** (Desf.) Bor; see 4: 445.

? Trymalium ramosissimum J.W. Audas: the author suspects that this plant is a hybrid between T. daltonii F. Muell. and Spyridium parvifolium (Hook.) F. Muell.; T. ramosissimum is usually difficult to locate and then only when T. daltonii and the Spyridium are present.

C Utricularia aurea Lour.: **U. australis** R.Br.; see 24: 576.

+ **Utricularia dichotoma** Labill: plus **U. sp.** Two species are involved—
(a) usually with several large royal purple flowers each with about seven yellow stripes at base of "apron" (S.W. Victoria).
(b) usually 1-3 smaller blue-purple flowers with 3 yellow stripes (widespread in Victoria).

S *Veronica derwentiana* Andr.: **Parahebe derwentiana** (Andr.) B. Briggs & Ehrend.; see Briggs & Ehrendorfer, *Taxon* 17: 742 (1968).

+ **Veronica gracilis** R.Br.: plus another species; B.G. Briggs pers. comm.

S *Veronica perfoliata* R.Br.: **Parahebe perfoliata** (R.Br.) B. Briggs & Ehrend.; see Briggs & Ehrendorfer, *Taxon* 17: 742 (1968).

S,— **Vicia angustifolia* L.: ***V. sativa** L. in part; see Ball in 19:134.

+ **Viola hederacea Labill:** plus possibly another species with woolly blue flowers and fewer hairs in the throat. (S.W. Victoria and S.E. of South Australia).

+ Wahlenbergia spp: plus other species; R. Carolin & P. Smith pers. comm.

C,+ Wolffia arrhiza (L.) Hork. ex Wimm. var. australiana Benth.: **Wolffia autraliana** (Benth.) Hartog & Plas Note: **W. globosa** (Roxb.) Hartog and Plas is also in Victoria; see 2: 256.

S *Xanthorrhoea hastilis* R.Br.: **X. resinosa** Pers.; see Lee, *Contr. N.S.W. natn. Herb.* 4: 44 (1966) and 23: 443.

+ **Xanthosia dissecta** Hook. f.: plus **X. leiophylla** F. Muell. ex Klatt; NSW pers. comm.

— *Zea mays L.: best deleted from the Victorian flora; see 23: 213.

+ Zieria arborescens Sims: Possibly includes another species (Grampians).

S *Zostera tasmanica* Martens ex Aschers.: **Heterozostera tasmanica** (Martens ex Aschers.) den Hartog; see 2: 325.

+ **Zygophyllum aurantiacum** (Lindl.) F. Muell.: plus **Z. eremaeum** (Diels.) Ostenf.; see Ostenfeld, *Biol. Meddr.* 3: 76 (1921).

+ Zygophyllum glaucum F. Muell.: possibly includes another species (Murray River flood plains); Hj. Eichler pers. comm.

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Corrections to some of the information in "Koala, Australia's native bear"

I am writing, as a "koala expert", in response to the article by M. J. Lester in Vict. Nat. Vol. 95, p. 35. I have been conducting research on koalas since the start of 1972 and so I feel competent to point out a number of errors among the so-called "facts" presented by M. J. Lester.

Allow me to correct the errors in the order in which they appear in M. J. Lester's paper.

1. The koala is active, intermittently, throughout the day and night. To the layman it appears to sleep throughout the day only because a koala's reaction to any disturbance is to "play possum" by appearing to be asleep.
2. The word koala comes from the language of the Katang people who originally lived in an area north of Sydney. It does not mean "don't drink" or "no water" — the Katang equivalents of these phrases are "bidjagi giwi", and "badu giwi", respectively. The word "koala", which is a Katang word, has no meaning other than the name of the animal. M. J. Lester's "no drink animal" would be rendered as "bidjagi giwi koala" or perhaps "badu giwi koala".
3. There is no evidence that drinking (presumably water) causes any ill effects in healthy koalas. Healthy koalas have been observed drinking under natural conditions.
4. There is no evidence that the koala is stupid.
5. The substance which Lester calls pap is indeed important in innoculating the pouch-young with digestive bacteria. However, there is no evidence that the mother's milk is ever insufficient to the point that it needs supplementation. The ingestion of pap by the pouch-young occurs only over a very short period (a matter of days) and appears to serve the sole function of innoculation of bacteria into the caecum.

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The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 32 in the previous issue)

BY JAMES A. BAINES

***Pentaschistis.** Gk pente, five; schistos, cut; the flowering glume has about five divisions at the summit. Our species, **P. airoides*, False Hairgrass, introduced from South Africa, was classified in *Pentameris* (= five parts) from 1834 to 1899; the specific epithet means 'like *Aira*', the plant being very similar superficially to *A. caryophyllea*, Silvery Hair-grass. Schist is a crystalline rock also named from Gk schistos, to split, also the English noun schism.

Pentatropis. Gk pente, five; tropis, a keel (cf. tropos, a turn); alluding to the five prominent corona lobes. Our species is *P. quinquepartita*, Purple Pentatrope, the specific epithet meaning deeply divided into five parts. It is closely related to *Tylophora* in family Asclepiadaceae, although it grows in the N.W. of the State compared with the S.E. habitat of the latter.

'The Victorian Naturalist Author Index, 1884-1976'

Compiled by James A. Baines

Supplementary List of Errata, Omissions and Addenda

Errata sheets are issued with every copy of this publication, but some additional changes should be made by purchasers, as under:

Page 6, second 1893 item: This 'anonymous' contribution was sent to Baron von Mueller by Mr. Aeneas Gunn, the 'Maluka' of Mrs. Gunn's books 'We of the Never-Never' and 'The Little Black Princess' (Elsey Station).

	Vol.	pp.
P. 17 ANONYMOUS After 1972 item add:		
1975 Elusive Bird Species (Marbled Frogmouth) photographed, Cape York Peninsula (illus.)	92	254-5
P. 18 ASHBY, E. ASHBY, Edwin (father of Alison Ashby, wildflower painter).		
P. 23 BAINES, James Austin. Add new address: 19 Sunningdale Ave., Torquay 3228.		
P. 24 BAINES, James Austin. Add the following omitted items:		
1975 Ditto — *Histiopteris* to **Lathyrus*	92	208-213
1975 Ditto — **Lavandula* to **Lycium*	92	265-269
1975 'Field Guide to the Flowers and Plants of Victoria', by J. H. Willis, B. A. Fuhrer and E. R. Rotherham (book review)	92	273-274
1976 Origin of Generic Names, etc: *Lycopodium* to *Mentha*	93	27-30
1976 Ditto — *Menyanthes* to *Micromyrtus*	93	68-69
1976 Ditto — **Momordica* to **Nicandra*	93	162-164
1976 Ditto — *Nitraria* to *Opercularia*	93	182-184
P. 26 BALE, William Mountier (1851-1940)		
Add obituary by E. E. Pescott	57	140
Add short biography by Dr. B. Smith and Jeanette E. Watson	86	105-110
(Place these items in brackets.)		
P. 40 BENNETT (Mrs) Eulalie E. (Sandringham) Delete first 1957 item, which was contributed by her daughter, Eulalie P. brewster (née Bennett) correctly indexed under BREWSTER, (Mrs) O. G., p.49.		
P. 49 BRITTLEBANK, C. C. Add, in brackets:		
1946 'The late Charles C. Brittlebank', by E. E. Pescott	62	189-191
P. 55 BURNS, A. N. After 1962 item add: (in brackets)		
1964 'Retirement of Mr. A. N. Burns', by R. T. M. Pescott	81	167
P. 63 CARTER, H. J. Add:		
1932 Thomas Gibson Sloane, 1857-1932 (obituary, with photograph portrait)	49	191-194
P. 78 COGHILL, E. H. Add, in brackets:		
1967 'Obituary — E. H. Coghill', by A. G. Hooke and N. A. Wakefield	84	200-201
P. 88 COOPER, Roy P. After 1907- add 1976.		
Author of 'Birds of a Salt-field', 'Is the Helmeted Honeyeater Doomed?', 'Wilson's Promontory National Park and its Avifauna', etc.		
P. 92 CROLL, R. H. Add, in brackets:		
1948 'Noted Naturalists Die: Charles Daley, R. H. Croll', by E. E. Pescott	64	202
P. 93 CUDMORE, F. A. Add obituary by F. S. Colliver	73	144
P. 97 DALEY, Charles. Add as above (see Croll, R. H.)	64	202
P. 105 DODDS, Roy R. Add in brackets: (Chairman, Geology Group, F.N.C.V.)		
P. 106 DUNN, Edward John. Add obituary by A. S. Kenyon: 'Edward John Dunn' (with portrait)	54	20

Field Naturalists Club of Victoria

Reports of FNCV activities

General Meeting
Monday 13 February 1978

The speaker was Mr. Robert Burns on "Victorian Nudibranchs". Mr. Burns explained that Nudibranchs are molluscs in the division Opisthobranchia (gills behind the heart), the most advanced marine gastropods equal to the land snails and, like land snails, they are all hermaphrodite. Some have an external shell, some an internal one, and some no shell at all.

Mr. Burns showed colour slides of several of Victoria's 200 Opisthobranchia but there are more than 1000 in Australian waters. The first slide was a familiar Bubble-shell but unfamiliarly nestling among extensive folds of orange-pink flesh (the mantle) that would seem impossible to cram into the shell. Bubble-shells were followed by Sea-hares where the shell is reduced to a small horny plate.

The true Nudibranchs (sea-slugs) have no shell and the gills are exposed on the surface with no protection except the ability of retraction. Victorian Nudibranchs might be only a few millimetres long or several centimetres (up to about 6") and have a more-or-less slug shape. But they can be any imaginable colour or an astonishing combination of colours. The slides showed species of brilliant hues or pastels, and in many the gills were particularly ornamental — a flower-like wheel of frills, puffs or feathers on the back towards the hind end. And the antennae (rhinophores) towards the front were sometimes a contrasting colour or banded. As well as the flower-like gills, some species had strange protruberances from the body. Mr. Burns explained that the digestive organs often extend into such ornamental processes.

Exhibits. Oak leaves had many brownish pustules to a centimetre across. Investigation had revealed several tiny grey caterpillars 2-4mm long and some brown pupae. One of the pupae had been removed and had hatched into a moth about 4mm long. Specimens of all three were displayed under microscopes. There was also a black pupa, thought to be of a parasitic wasp. Similar pustules were reported on several oak species but few on Pin Oaks.

Other exhibits included desmids under microscopes, a huge toadstool *Boletus* sp. 25-28cm across, an unidentified black beetle about 1½cm long, and photos taken in the You Yangs some years ago.

Orchid and Wasps. Small tongue-orchids *Cryptostylis leptochila* have been growing in Ros Garnet's Pascoe Vale glass-house for 20 years. Every flowering season male ichneumon wasps enter via the half-open louvres at about 10 a.m. and 4 p.m. and attempt to mate with the flowers, presumably under the belief they are female wasps. The flowers have no smell perceptible to humans and are not native to the area.

General Meeting
Wednesday, 15th March 1978

The President (Mrs. Margaret Corrick) welcomed Mr. David Fletcher, the President of the Society for Growing Australian Plants, and offered congratulations to the Society on reaching its 21st anniversary. She then handed the meeting over to Mr. Dan McInnes who introduced the speakers from the Microscopical Society. An apology was received for the absence of Mr. Paul Genery who was recovering from a successful operation.

Talks on "Introduction to Microscopes". Mr. Daws spoke on the history of the microscope and illustrated his talk by referring to the fine collection of eighteenth and nineteenth century microscopes displayed.

Mr. McInnes spoke on the "do it yourself" microscopes and showed how, from a tube, a standard eyepiece and objective lens, a microscope can be constructed. The F.N.C.V. microscope was an excellent example of how well this could be done.

Mr. Urwin Bates then gave a talk on the modern compound microscopes which were displayed and explained the principles of the condenser, the iris diaphragm and the light-

ing systems. Dr R. Hammond explained the principles of the stereo miscroscope which is an excellent instrument for viewing objects needing relatively low magnifications.

V.F.N.C. Association Meeting at Creswick. Mr Garnet Johnson and Mr Dan McInnes spoke on the wonderful hospitality extended by the President and members of the Creswick Field Naturalist Club to all the members of the various clubs who attended the annual meeting of the Victorian Field Naturalist Association during the Labour Day weekend.

On the Saturday, Mr Albert Perry, President of the V.F.N.C. Association, led a tour to the native garden of Mr Alan Sonsee, Springmount. Later he showed the group the area of the Deep Lead mines and, in the evening, gave an illustrated talk on the subject. On Sunday, the group visited the quartz crushing Battery. From there, they proceeded to Slaty Creek. The recent bush fires had burnt away the undercover and revealed traces of miners' settlements, old paths and mounds of Chinese gardens. On Monday, the Forest Commission Nursery was visited and members received excellent instruction on the growing and propagation of plants. Later the group wandered through the extensive parklands of the Victorian School of Forestry. The F.N.C.V. Club Members wish to express their thanks to the Creswick Field Naturalist Club and to the organizers of the V.F.N.C. Association for a very enjoyable long weekend.

"White Fly" Pupa Cases. Mr F. Morley produced the leaves of a tomato plant which had black specks on the undersides of the leaves. They are the pupa cases of the "white fly" *Trialeurodes vaporariorum*. The larvae had been parasitized by a wasp.

Biggest Banksia!

Beach Road
Just past Ricketts Point
13 February 1978

Dear Naturalist,

I hope you will not be misled by that libel in February "Victorian Naturalist"

On page 37 a paragraph mentions a photograph of a Coastal Banksia at Beaumaris with a girth of 15ft 8ins. This was a photograph of me taken 10 years ago. A very good likeness at the time I admit, but to suggest that my waistline is a skinny 15 feet is a scandal. My measurement is a proud 21 feet just below my four branches which are all over 8 feet in girth.

Hoping justice will be done in the next issue of the Vic.Nat.

Yours sincerely,
Betty the Biggest Banksia.

P.S. Come and see me sometime.

Apology from FNCV Reporter

In February issue the photograph was correctly reported to be Betty Banksia, but the dimensions referred to another Banksia — one at Main Creek near the Boneo Road towards Flinders. I regret the confusion and apologise to Betty for the slight to her stature.

M.J.L.

FNCV Financial Report as at 31 December 1977

Auditors' Report to the Members of the Field Naturalists Club of Victoria

In our opinion —

(a) The attached balance sheet and income and expenditure account are properly drawn up in accordance with the provisions of the Companies Act, 1961 of Victoria as amended and so as to give a true and fair view of:—
  (i) the state of affairs of the Club at 31 December 1977 and of the results of the Club for the year ended on that date; and
  (ii) the other matters required by Section 162 of that Act to be dealt with in the accounts.

(b) The accounting records and other records, and the registers required by that Act to be kept by the Club have been properly kept in accordance with the provisions of that Act.

DANBY, BLAND, PROVAN & CO.,
Chartered Accountants.
R. M. BLAND, Partner.

Richmond, 4th April, 1978.

The members of the Executive Council submit herewith balance sheet as at 31 December 1977 and income and expenditure account for the year ended on that date, and report as follows:—

1. The Net Surplus of the Club for the year ended 31 December 1977 was $150 which added to the Surplus brought forward at 1 January 1977 of $8,923, together with a transfer of $219 from Club Improvement Account and $320 from other Funds resulted in a surplus to be carried forward to next year of $9,612.
2. The members of the Executive Council took reasonable steps to ascertain, before the income and expenditure account and balance sheet were made out, that all known bad debts were written off and adequate provision was made for doubtful debts.
3. The members of the Executive Council took reasonable steps, before the income and expenditure account and balance sheet were made out, to ascertain that the current assets, other than debtors, were shown in the accounting records of the company at a value equal to or below the value that would be expected to be realised in the ordinary course of business.
4. At the date of this report, the members of the Executive Council are not aware of any circumstances which would render the values attributable to the current assets in the accounts misleading.
5. No charge on the assets has arisen, since the end of the financial year to the date of this report, to secure the liabilities of another person. No contingent liability has arisen since the end of the financial year to the date of this report.
6. No contingent or other liability has become enforceable or is likely to become enforceable within the period of twelve months after the end of the financial year which in the opinion of the members of the Executive Council will or may affect the ability of the Club to meet its obligations as and when they fall due.
7. At the date of this report the members of the Executive Council are not aware of any circumstances not otherwise dealt with in the report or accounts which would render any amount stated in the accounts misleading.
8. The results of the Club's operations during the financial year, in the opinion of the members of the Executive Council, were not affected by any item transaction or event of a material and unusual nature.
9. Since 31 December 1977, and to the date of this report, in the opinion of the members of the Executive Council, no item transaction or event of a material and unusual nature has occurred, which would affect substantially the results of the Club's operations for the next succeeding financial year.
10. No member of the Executive Council, since the end of the previous financial year, has received or become entitled to receive a benefit by reason of a contract made by the Club with the member or with a firm of which he is a member or with a company in which he has a substantial financial interest.
11. The principal activities and objects of the Club are to stimulate interest in natural history and to preserve and protect Australian Fauna and Flora. No significant change in the nature of those activities occurred during that period.
12. The names of the members of the Executive Council in office at the date of this report are as follows—

    Mrs M. Corrick
    Mr D. Lee
    Miss M. Allender
    Miss S. Beattie
    Miss M. Lester
    Mr. P. Genery
    Mr G. Johnson
    Mr J. Martindale
    Mr T. Sault
    Dr B. Smith
    Mr D. McInnes

This report is made in accordance with a resolution of the Executive Council dated 4th day of April, 1978.

M. Corrick, President.
D. E. McInnes, Treasurer.

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF INCOME AND EXPENDITURE FOR YEAR ENDED 31 DECEMBER, 1977

Year 1976	Income			Year 1976	Expenditure		
	Subscriptions Received —				Victorian Naturalist —		
$179	Arrears	$226		$6,350	Printing	$8,465	
8,983	Current	8,953		1,512	Illustrating	918	
271	Supporting	103		1,046	Despatching	857	
				85	Editorial	59	
$9,433			$9,282	$8,993		$10,299	
$295	Sales of "Victorian Naturalist"		206		Less — Grants —		
	Interest Received —			(905)	Ingram Trust — 1977 Grant	1,705	
$5	Library Fund	$5		—	Treasury (Note 3)	—	
93	Bank Account	107		$8,088			$8,594
193	Commonwealth Bonds	190			Working Expenses —		
501	Bonds — M. Wright Legacy	494		$271	Postage and Telephone	$307	
96	Bonds — C. M. Walker Legacy	95		218	Printing and Stationery	144	
439	National Mutual Deposit	561		40	Rent of Room for Storage	40	
48	Life Membership Fund	48		114	General Expenses	181	
$1,375			1,500		Affiliation Fees, Subscriptions and Donations	184	
20	Profit — Victorian Naturalist Author Index		89	131	Hawthorn Junior Club Rent	—	
121	Sundry Income		119	22	Natural History Medallion Expenses (less Interest from Fund $53)	9	
				94	Typing and Clerical Assistance	1,005	
				834	Auditors' Remuneration (Note 1)	100	
				75	Rent of Hall, Library and Museum Room	338	
				360	Insurance	144	
				141			2,452
				$2,300			
				$856	Surplus for year		150
$11,244			$11,196	$11,244			$11,196

Notes: 1. Auditors' Remuneration of $100, relates to Auditing services only. No other benefits were received by the Auditors in respect of their services to the Club.
2. No Emoluments were paid by the Club to any member of the Executive Council.
3. State Treasury Grants for 1975/76, 1976/77, and 1977/1978 have been received but have not been applied against expenditure at 31/12/1977.

FIELD NATURALISTS CLUB OF VICTORIA

BALANCE SHEET AT 31 DECEMBER, 1977

Year 1976	LIABILITIES		
	Current Liabilities		
$686	Subscriptions paid in advance	$578	
2,342	Sundry Creditors	1,963	
18	M. A. Ingram Trust Grant in hand	18	
3,000	Treasury Grants in hand	4,500	
$6,046			$7,059
	Special Funds & Accounts		
$4,226	Building Fund	$4,611	
13,300	Publication Fund	15,117	
5,296	Excursion Fund	1,821	
—	Marie Allender Excursion Fund	4,000	
100	Library Fund	100	
2,554	Club Improvement Account	4,056	
5,217	Estate M. Wright Legacy	5,217	
300	P. E. Morris Gift Account	300	
200	Estate I. F. Knox Legacy	200	
1,466	Estate C. M. Walker Legacy	1,466	
20	Estate R. S. Chisholm	20	
705	Wilfred C. Woollard Fund	577	
624	D. E. McInnes Fund	498	
184	Microscope Project Account	218	
4,835	Flower Book Account	5,350	
13	Trailer Account	13	
52	N. A. Wakefield Memorial Fund	52	
—	H. & B. E. Miller Fund	228	
200	Estate Ivy Dixon	200	

Year 1976	ASSETS		
	Current Assets		
$2,066	Cash at Bank	$2,284	
2,000	Commonwealth Bonds at Cost	2,000	
553	Sundry Debtors	1,411	
	Stocks on Hand at Cost —		
65	Badges	49	
68	Microscope Project	261	
2,428	Books for Sale	1,832	
193	Flower Books	171	
450	Victorian Naturalist Author Index	—	
	Prepayment —		
202	Victorian Naturalist Subject Index	202	
$8,025			$8,210
	Fixed Assets at Cost		
$6,117	Library Furniture and Equipment	$6,656	
6,117	*Less* written off	—	$6,656
—	Land —		
141	Cosstick Reserve, Maryborough	141	
—	Harold C. Frahm, Kinglake	—	
$6,258			6,797
	Investment of Funds at Cost		
100	Australian Government Bonds	$100	

400	Life Membership Fund	400			Australian Government Savings Bonds	10,900	
374	Natural History Medallion Fund	506		10,200	M.M.B.W. Debentures	500	
170	Kinglake Project Account	135		500	Esanda Ltd. Debentures	5,700	
$40,236			45,085	1,300	National Mutual Permanent Building Society — Deposit	8,000	
	Surplus Account			6,000			25,200
$8,044	Balance at 1/1/77	$8,923		$18,100			
23	Transfer from Club Improvement Fund	219			**Building Fund**		
	Transfers from Funds for purchase of Equipment —			$3,300	Australian Government Savings Bonds at Cost	$3,300	
—	D. E. McInnes Fund	160			Esanda Ltd. — Debentures at Cost	1,100	
—	W. C. Woollard Fund	160		900	Cash at Bank	211	
856	Surplus for year	150		26			4,611
$8,923			9,612	$4,226			
					Publications Fund		
				$10,800	Australian Government Savings Bonds at Cost	$11,600	
					Book Stocks at Cost —		
				803	Ferns of Victoria and Tasmania	3,624	
				42	Wildflowers Wilson's Promontory	70	
				341	Birds of the Dandenongs	287	
				742	Sundry Debtors	616	
				587	Cash at Bank	166	
				$13,315		$16,363	
				15	*Less* Sundry Creditor	1,246	
				$13,300			15,117
					Excursion Fund		
				$3,116	Deposit Stock — ANZ Bank	—	
				—	Australian Government Savings Bonds at Cost	$1,000	
				3,515	Cash at Bank	821	
				$6,631		$1,821	
				1,335	*Less* Sundry Creditors	—	
				$5,296			1,821
$55,205			$61,756	$55,205			$61,756

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31 December 1976		$4,226
Interest on Investments and Bank Account		385
Amount of Fund at 31 December 1977		$4,611

PUBLICATIONS FUND

Amount of Fund at 31 December 1976		$13,300
Interest on Investment and Bank Account		978
Surplus (Loss) for the year from —		
Ferns of Victoria and Tasmania	$806	
Wild Flowers of Wilson's Promontory National Park	26	
Birds of the Dandenongs	7	839
Amount of Fund at 31 December 1977		$15,117

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31 December 1976		$2,554
Booksales Account Profit		1,721
		4,275
Less –		
Purchase Library Books and Equipment transferred to Surplus Account		219
Amount of Account at 31 December 1977		$4,056

EXCURSION FUND

Amount of Fund at 31 December 1976		$5,296
Less –		
Transfer to Marie Allender Excursion Fund		4,000
		1,296
Add –		
Interest Received on Investment	$424	
Surplus on Tours	101	525
Amount of Fund at 31 December 1977		$1,821

Statement by the Members of the Executive Council

In the opinion of the members of the Executive Council of the FIELD NATURALISTS CLUB OF VICTORIA, the accompanying Balance Sheet is drawn up so as to give a true and fair view of the state of affairs of the Club as at 31 December 1977, and the accompanying Statement of Income and Expenditure is drawn up so as to give a true and fair view of the surplus of the Club for the year ended 31 December 1977.

Signed in accordance with a resolution of the Executive Council on 4th April 1978.

M. Corrick, President.
D. E. McInnes, Treasurer.

Statement by the Principal Accounting Officer

I, Daniel E. McInnes, being the officer in charge of the preparation of the accompanying accounts of the FIELD NATURALISTS CLUB OF VICTORIA for the year ended 31 December 1977 state that, to the best of my knowledge and belief, such accounts give a true and fair view of the matters required by Section 162 of the Companies Act 1961, to be dealt with in the accounts.

Signed at Melbourne on the 4th day of April 1978.

D. E. McInnes.

(Continued from page 42)

Queensland in July. Would members be interested in an excursion to Queensland for two weeks in July? The plan is to go by air and spend most of the time in the Whitsunday area with a few days at the Eungella National Park. Accommodation would mainly be room only with cruises and tours extra. Cost would vary with type of accommodation, but air fare and accommodation with cooking facilities and restaurants nearby would probably be from $350 to $430, but cheaper if anyone wished to camp with camping equipment supplied.

GROUP MEETINGS

All FNCV members are invited to attend any Group Meeting; no extra payment.

At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month — Geology Group

Wednesday, 3 May. Informal discussion led by Mr Lyal Harris (Melbourne University) on "Geologically significant sites around Melbourne".
Wednesday, 7 June. "Limestone caves of Victoria". Mr Lloyd Mills (Speleology Association).
Wednesday, 5 July. "Aboriginal culture of Australia". Dr Gallus.

Third Wednesday in the Month — Microscopy Group

Wednesday, 19 April. Various methods of illuminating objects to see the most detail — top lighting, bright field, dark ground, Rheinberg illumination. ¼-hour members' exhibits.
Wednesday, 17 May. Simple methods of mounting dry objects for microscope examination — insect parts, mineral sands, seeds, forams, textiles, small shells, etc. ¼-hour members' exhibits.
Wednesday, 21 June. How to prepare and mount objects in Canada balsam, glycerine jelly, Euparal and other mountants. ¼-hour members' exhibits.

Second Thursday in the Month — Botany Group

Thursday, 13 April. Four short talks.
Thursday, 11 May. "Introduction to Fungi". Mr Bruce Fuhrer.

At the Conference Room, National Museum at 8.00 p.m.
Good parking area — enter from Latrobe Street.

First Monday in the Month — Entomology and Marine Biology Group

Monday, 1 May. "Food plants of insects". Mr Peter Carwardine.
Monday, 5 June. "Use of *Drosophila melanogaster* in genetics". Mr Peter Kelly.
Monday, 3 July. "Dragonflies and damsel flies". Mr Urwin Bates.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.

First Thursday in the Month — Mammal Survey Group

Thursday, 4 May, 1 June, 6 July.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions.

GEOLOGY GROUP

Geology excursions to be announced at Group meetings.

BOTANY GROUP

Saturday, 22 May. "Seaweeds". Leader Mrs Dora Sinkora. Area to be announced.
Saturday, 3 June. "Fungi". Leader Mr Bruce Fuhrer. FNCV Kinglake property.

Day Group — Third Thursday in the Month

Thursday, 20 April: Train Outing to Ferntree Gully National Park. Train to Upper Ferntree Gully Railway Station leaves Flinders Street at 10.15 a.m. arriving 11.16 a.m.
Thursday, 18 May: Williamstown. Train leaves Flinders Street at 11.13 a.m. arrives Williamstown 11.40 a.m. Meet at station; then walk to Shelley Beach.
Thursday, 15 June: Weather Bureau. Meet at Carlton Gardens, near corner of Latrobe and Spring Streets at 11.30 a.m. for lunch after which we cross to the Commonwealth Centre to meet our Guide at 1.25 p.m. Once again the number is limited, so please contact the Secretary before the due date.

Weekend Camps of Mammal Survey Group

22-23 April. Strathbogie Ranges. **10-12 June.** Gelliondale (near Yarram).
20-21 May. Cathedral Ranges.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C

Key Honorary Office-Bearers 1977-1978

President:

Mrs. MARGARET CORRICK, 7 Glenluss Street, Balwyn, 3103. (857 9937.)

Vice-President: Mr. DAVID M. LEE, 15 Springvale Road, Springvale, 3171

Secretary: Mr. G. JOHNSON, 20 Sydare Avenue, Chadstone, 3148 (56 3227).

Correspondence to: FNCV, National Herbarium, The Domain, South Yarra, 3141.

Treasurer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern, 3145 (211 2427).

Subscription-secretary: Mr. F. J. KOTH, 21 Smart Street, Hawthorn, 3122.

Editor: Mr. R. D. KENT, 16 Papua Street, Watsonia, 3087. (435 8664.)

Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3161. (527 2749.)

Sales Officer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern, 3145. (211 2427.)

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

Botany: Mr. CAMERON McCONCHIE, 158 Warrandyte Road, Ringwood, 3134 (870 9986).

Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127. (89 2850.)

Field Survey: Mr. R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126 (836 8009.)

Geology: Mr. T. SAULT, c/o National Herbarium, South Yarra, 3141.

Mammal Survey: Mr. MICHAEL HOWES, 10 Palmer Street, Fitzroy, 3065.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1977

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Members, Subscribers and Retired Persons	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$1.20

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary

JENKIN BUXTON PRINTERS PTY. LTD., WEST MELBOURNE

the victorian naturalist

Vol. 95, No. 3 May/June, 1978

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
In which is incorporated the Microscopical Society of Victoria

F.N.C.V.

$1·20

Category "B"

Registered in Australia for transmission by post as a periodical.

FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra.

Monday, 12 June, 8.00 p.m.
Speakers: Ms Alison Oates, Assistant Curator in Anthropology and Ms Annette Seeman, Education Officer, both from National Museum of Victoria.
Subject: Plant foods of Victorian Aborigines.

Monday, 10 July, 8.00 p.m.
Speaker: Mr J. Blyth, Survey Officer, National Museum of Victoria.
Subject: Aquatic Invertebrate Surveys — Aims and Methods.

Monday, 14 August, 8.00 p.m.
Speaker: Dr P. J. Keame, Lecturer in Botany, La Trobe University.
Subject: Fungi in the Environment.

New Members — June General Meeting

Ordinary
Miss Helen Bartossewicz, 23 Henry Street, Kensington, 3031
Mr R. Barker, The Ridgeway, Mt Evelyn, 3796
Mr Peter Bascomb, 51 Park Drive, Parkville, 3052
Mrs B. Dry, 20 Charles Street, Kew, 3101
Mrs M. Evans, 60 Fromer Street, Moorabbin, 3189
Mr Donald McG. Ewart, 2 Wattle Valley Road, Canterbury, 3126
Mr J. Gardner, 7 Illawarra Crescent, North Dandenong, 3173.
Mr D. Hansch, 38 Sandells Road, Tecoma, 3160
Mrs G. Lumetzbererger, 16 Tiverton Drive, Mulgrave, 3170.
Mrs Joy Martin, 19 Shakespeare Street, North Carlton, 3054.
Mr Peter Mathews, 31A Howard Street, Glen Iris, 3146 (Botany & Mammals)
C. S. Proctor, 24 Darling Street, Oakleigh, 3166
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FNCV EXCURSIONS

Sunday, 18 June. Yan Yean and Toorourrong Reservoirs. Coach will leave Batman Avenue at 9.30 a.m. Fare $5.00. Bring one meal.

Sunday, 16 July. Annual Boneseed Pulling Day at Studley Park. We have concentrated on small areas each year and the results to date are very encouraging so come along and give a hand. Tom Sault is the leader. Meet at the second picnic area along the Boulevard, just past Molesworth Street and opposite the Kew Psychiatric Hospital at 10.00 a.m. Look for the FNCV sign. Members can join in later if unable to be there at 10.00. Those going by bus will be met at 10.00 a.m. and 11.00 a.m. at bus stop No. 28, Studley Park Road.

Saturday, 22 July-Saturday, 5 August—Queensland. The plane leaves at 7.00 a.m. Saturday for Proserpine from whence the party will travel by road to Airlie Beach where accommodation has been booked on a room only basis for the fortnight. Airlie Beach is near Shute Harbour where cruises leave daily for islands in the Whitsunday Group and also near the Conway National Park. On Sunday, 30 July the party will leave for a three night stay at Eungella National Park with full board. On the return to Airlie Beach there will be an overnight stop at Mackay, dinner, bed and breakfast and a visit to Cape Hillsborough National Park. The cost will be $500.00 plus meals and any cruises taken from Airlie Beach. Caravan accommodation is $40.00 cheaper. Prices based on 30 members going and twin share accommodation at Airlie Beach, multishare at Eungella. The full amount less deposit already paid should reach the excursion secretary by the General Meeting on 12 June if possible, otherwise by the Friday of that week as the Tourist Bureau requires the payment well in advance of the trip.

Sunday, 20 August. Cranbourne. Details in next Naturalist.

(Continued on page 123)

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Cover Illustration: Veteran of Mt Buffalo. Photo by Mrs Zillah Lee

Aboriginal Material Culture

No. 2 on Spearthrowers and Paddle Steamers

BY A. L. WEST*

For thousands of years spearthrowers have been a part of man's tool kit, their function being to provide increased leverage, speed and accuracy in the discharge of spears. In Europe, mainly in southern France, in the area between the Dordogne and the Pyrenees, Upper Palaeolithic specimens made of reindeer antler have been found. Many of these spearthrowers, dating to about 14,000 years ago, are beautifully carved in the form of birds, fish and other animals such as ibex, bison and reindeer (Leroi-Gourhan, 1968).

Spearthrowers or *woomeras*, a word which apparently came into Australian usage as a result of early settler contact with coastal Aborigines in New South Wales (McCarthy, 1946), are well-known Australian artefacts. They were made principally from wood and because no specimens have yet been found in the archaeological record we have no definite knowledge of their antiquity. There is however general agreement amongst scholars that because of its continent-wide distribution the spearthrower has been in use here for a very long time.

Spearthrower forms varied considerably throughout Australia. Aborigines in Victoria and neighbouring areas of South Australia and New South Wales fashioned an impressive type of slender spearthrower with the point carved out of the solid wood[1] (Figs. 1 and 2).

A fine spearthrower (X1825) of this type, from Victoria, came into the collections of the National Museum of Victoria in 1891. It previously belonged to a Miss I. De Beer, a member of a Melbourne family whose business interests included ship broking.

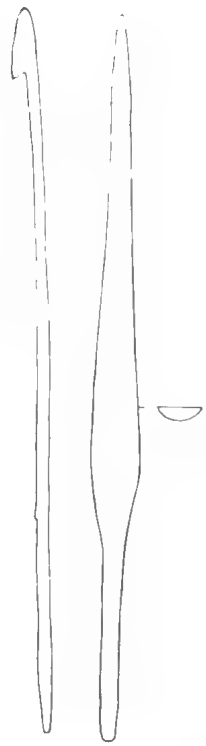

Fig. 1. Two views of Victorian spearthrower (X1825) with cross section.

The register entry, much of which cannot be taken at face value, is as follows:

> Spearthrower, "Kurruk" of Cypress Pine (Callitris verrucosa). For propelling small reed spears. Ornamented on both sides. Victoria.

Microscopic examination of the specimen[2] indicates that it was made from a hardwood Belar (*Casuarina cristata*) and

*Curator of Anthropology
National Museum of Victoria

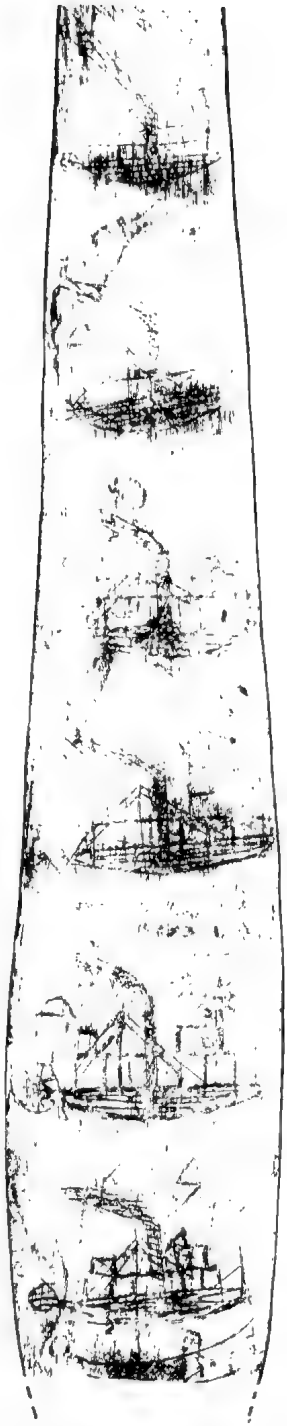

Plate 1. Part of the incised decoration on spearthrower (X1825), showing the profiles of stern-wheel paddle steamers. Approx. ¾ size. (Photo: A. M. Oates).

not from a *Callitris* sp. The original mistaken identification possibly arose from a consideration of the lightness of the artefact, a fact which superficially would appear to be more consistent with a soft wood than a hard wood. Its weight of 143 gm is well below the mean of 194 gm for the 41 Victorian spearthrowers in the collections.

It is also important to note that reed spears were not the only kind thrown by means of spearthrowers, in Victoria, and that the name *kurruk* was probably used only by the Wurundjeri tribe which occupied the Yarra River area (Smyth, 1878). Evidence suggests that this particular artefact did not originate in southern Victoria (see below) and therefore the use of the term *kurruk* is inappropriate.

The surface of the spearthrower is smooth and polished apparently from long use by its owner(s). It is thus likely that it was made many years before it was acquired by the Museum. It is 66.3 cm long and at its widest point is 4.3 cm wide and 1.3 cm thick. The upper surface (the surface adjacent to the spear) is flat, the lower one is convex and the handle cylindrical. It is decorated on all surfaces principally with banded and triangular areas of fine cross hatching and on the flat surface there appear, as well, the incised profiles of six stern-wheel paddle steamers (Plate 1). The incised designs have all been accentuated by a dark infill of pigment, possibly ground charcoal mixed with what appears to be a fatty substance.

Casuarina cristata, the wood from which the spearthrower is made, has a predominantly Mallee distribution in Victoria (Willis, 1972). This fact, together with the inclusion of stern-wheel paddle steamers in the decorations, strongly suggests that the artefact was made by a member of one of the Murray River tribes in north-western Victoria.[3]

But these paddle steamers are also particularly interesting for two other reasons. Firstly the vessels depicted are not the common type of side-wheeler but the rather rare stern-wheeler. Only 15 of about 200 paddle steamers which operated on the Murray/Darling Rivers throughout the his-

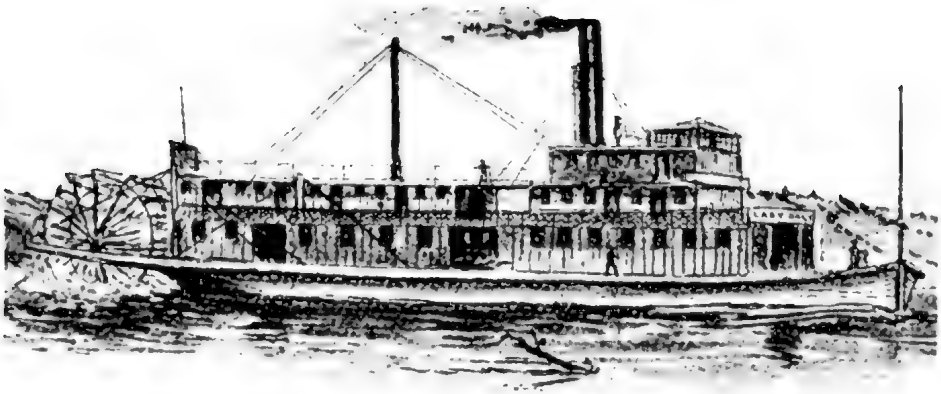

Fig. 3. The *Lady Daly*, a stern-wheel paddle steamer which operated on the Murray River System from 1862 to 1893 or 1894

Fig. 2. Diagram showing the use of a spearthrower (After Brough Smyth).

tory of the trade were stern-wheelers and two of these came into operation after this spearthrower was acquired by the Museum (Parsons & Tolley, 1967 and Fig. 3). Secondly, the paddle steamers are unique as a Victorian style of decoration on spearthrowers. No other spearthrower, from Victoria, in the Museum has representations of man-made objects as part of its decoration. Indeed, only nine others have incised line decorations representing plants, humans, and other animal forms. The majority, 31 out of 41, are either undecorated or show some kind of a wide range of geometric patterning. These facts suggest that ornamentation of Victorian spearthrowers with non-geometric forms resulted from European influences.

The craftsman who produced this spearthrower was conservative enough to make a finely balanced and functional artefact in the traditional style even though he must have been living in a bewildering world of rapid change. Yet he was also innovative enough to decorate his spearthrower in a non-traditional way. For a person venturing into a new mode of aesthetic expression he achieved a superb result. He has also provided an unusual glimpse into an exciting and fascinating period of Murray River history.

NOTES

[1] There are four south-eastern Australian spearthrowers in the collections of the National Museum of Victoria which have detachable bone points bound and cemented to the wooden shaft. Three are from Victoria (X1818, X1820, X27912) and one from southern N.S.W. (X1819).
Brough Smyth, 1878, I, p. 309, Figs. 91, 92 has illustrations of two south-eastern spearthrowers with detachable points but he states that they are teeth. According to Smyth it was the habit of Aborigines to fit new points to damaged spearthrowers, that is to those whose wooden points, carved from the solid, had broken off.

[2] Mr. W. A. Clifford, Forest Products Officer, Forests Commission of Victoria and Mr. J. Ilic, of the C.S.I.R.O. Division of Building Research provided this identification and I am grateful for their help.

[3] Paddle steamers were used in other parts of Victoria, the first one being the *Firefly* which commenced a ferry service from Port Melbourne to Williamstown as early as 1838 but it is clear from the records compiled by Parsons and Tolley (1967, passim) that stern-wheelers operated only on the Murray River system.

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VORG Conference, 21-23 July, 1978
Techniques of Research in Ornithology

The Victorian Ornithological Research Group is holding a Conference in Melbourne over the weekend of 21-23 July, 1978, entitled Techniques of Research in Ornithology. The Conference is open to anyone interested, and further information and registration forms are available from VORG Conference Secretariat, P.O. Box 203, South Melbourne, Victoria, 3205. As numbers are inevitably limited, registrations will be accepted in order of application.

Speakers and topics already arranged at the time of going to press are:—

Mr. Claude Austin, Nest Finding.
Mr. Peter Balmford, Ornithology and the Law.
Professor J. M. Cullen and Mr. David Paton, Setting up Research Projects.
Mr. Howard Jarman, Principles of Bird Identification.
Mr. Allan McEvey, The Ornithological Collections of the National Museums of Victoria.
Dr. G. F. Van Tets, Bird Behaviour.

In addition, a panel consisting of Ms. Margaret Blakers, Mr. Marc Gottsch, Mr. Len Jackson and Ms. Pauline Reilly will answer questions on the Atlas of Australian Birds, bird photography, recording bird calls, and bird banding; there will be an excursion to the La Trobe University Wild Life Area, led by Dr. Richard Zann of the School of Biological Sciences of that University; a series of short talks on current activity in ornithological research is being arranged; and it is hoped to hold an exhibition of works by wildlife artists on the Friday evening in conjunction with Conference registration.

The programme has been designed to cover an extensive range of research techniques; the speakers bring together a variety of ornithological skills and experiences; the excursion will keep before the participants the importance of the living bird; and the exhibition will remind them of the aesthetic delights which are for many of us an integral part of our involvement in ornithology.

Registration fee of $25 includes coffee on Friday evening, lunches, all morning and afternoon teas and bus fare on the excursion.

We hope that as many people as possible will attend and contribute to the Conference.

ROSEMARY BALMFORD,
for the VORG Committee.

Bush-peas of Victoria — Genus Pultenaea — 10

By M. G. CORRICK

Pultenaea foliolosa A. Cunn. ex Benth. in Ann. Wien. Mus. Naturg. 2:83 (1840)

Pultenaea foliolosa is an uncommon species in Victoria and apparently confined to two small areas in the eastern half of the state, one in the north-east between the Warby Range, Wodonga and Beechworth, and the other in Gippsland north of Maffra between the Macalister and Mitchell Rivers. It also occurs in New South Wales and Queensland. It favours dry situations in open forest, often on stony granite hillsides.

P. foliolosa is a soft, spreading, sometimes rather straggly shrub, 1-2 m high. The stems are terete, pubescent and rather pale. The tiny, alternate, elliptic or almost orbicular leaves are 1-3 mm long and 1-2 mm wide. The upper surface is usually pubescent and concave with involute margins. The lower surface is darker in colour with spreading hairs and often wrinkled when dry. The mid-vein is inconspicuous.

The slender, lanceolate stipules are 1-2 mm long, light to dark brown and stand well away from the stem.

Fig. 13a. Known distribution of *P. foliolosa*.

Fig. 13b. Known distribution of *P. procumbens*.

The flowers are axillary, bright orange with a rich purple-brown keel. The standard is broad, 7-8 mm high and 8 mm wide, with faint dark markings. The wings are usually orange.

The pubescent or villous calyx is 4-5 mm long with very broad, obtuse, oblique-tipped upper lobes. The lower lobes are acute and much narrower. The three-lobed bracteoles are attached at about the centre of the calyx tube. The centre lobe of the bracteole is green and leaf-like with spreading hairs. The two light brown, setaceous outer lobes resemble stipules. There are no floral bracts.

The ovary is glabrous except for a tuft of hairs at the base of the long, slender style. Flowering time in Victoria is from mid-October to mid-November. The pod is plump and hidden by the calyx which appears to enlarge as the fruit matures. The slender, curled style persists for some time on young fruit.

The distribution of this species as shown on the accompanying map does not include Grid S. Although recorded as occurring in this grid by Willis (1972) and Churchill and de Corona (1972) no supporting collections have been located in the National Herbarium, Melbourne.

SPECIMENS EXAMINED included: 8.8 km NNW Myrtleford, *A.C. Beauglehole 43774*, 7.xii.1973 (MEL 519876); Between Eldorado & Woolshed near Reedy Creek, *M.G. Corrick 5978*, 29.x.1978 (MEL 524876); Upper Murray R., *C. French Jnr.*, 1886 (MEL 519868); Near Killawarra, *T.B. Muir 1694*, 1 xi. 1960 (MEL 35142); Warby Ranges, *Miss D. Nason*, 18.ix. 1960 (MEL 519874); Freestone Creek between Briagalong and Cobbanah, *Mrs. C.N. Southwell*, Nov. 1960.

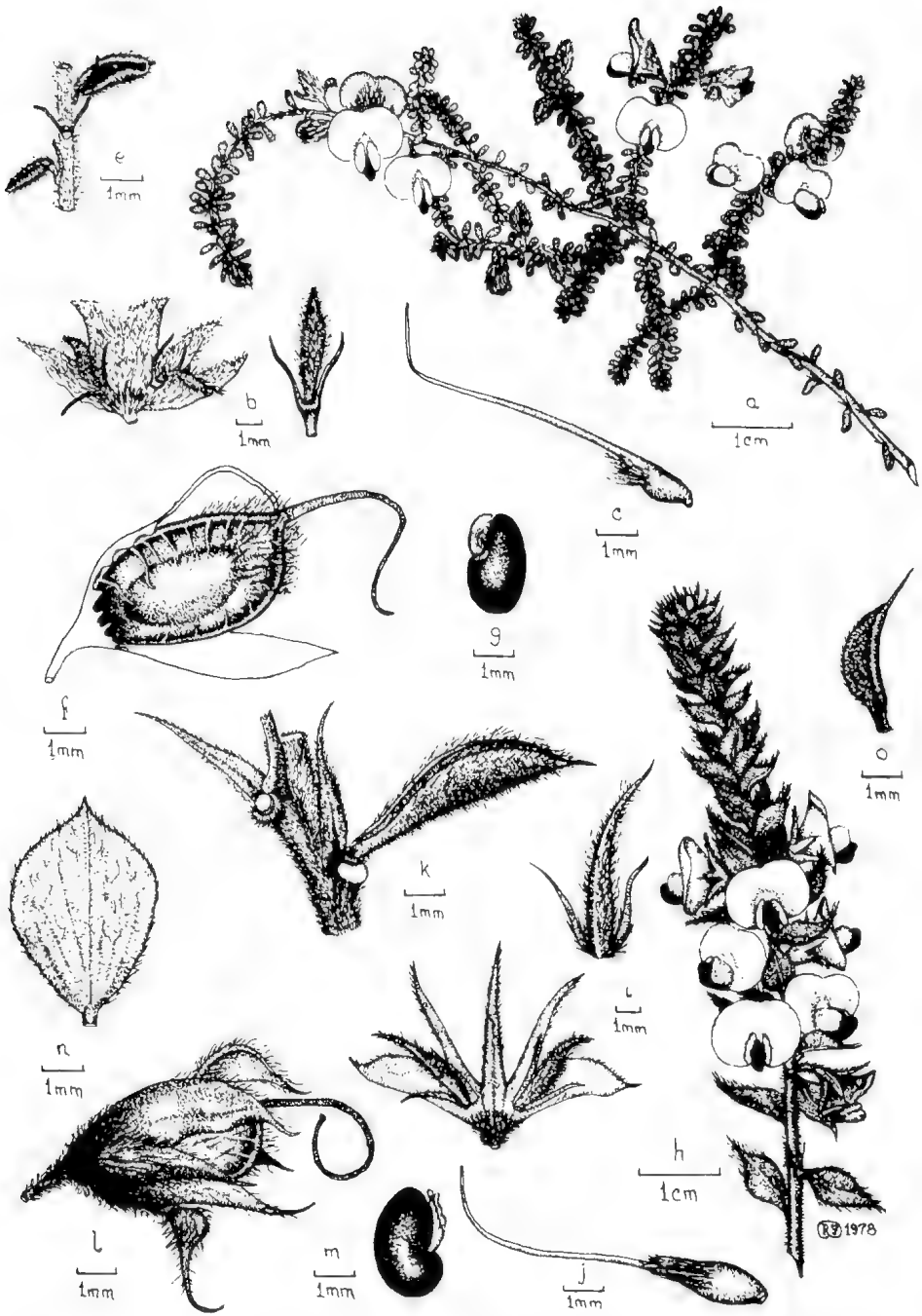


Fig. 13. a-g, *Pultenaea foliolosa*; a, habit; b, calyx and bracteoles, bracteoles drawn a little larger; c, style; e, leaf and stipules, all drawn from MEL 35142. h-o, *P. procumbens*; h, habit; i, calyx and bracteoles, bracteoles drawn a little larger; j, style; k, leaf and stipules from MEL 522258; l, pod, enclosed in enlarged calyx; m, seed; n, leaf form lacking pungent point from Beechworth, MEL 527203; o, narrow leaf form with long pungent point from Pine Mt. MEL 522249.

Pultenaea procumbens has a similar distribution in Victoria to *P. foliolosa*, although slightly more widespread and plentiful. Recent collections have extended its known range to Grids W and Z in Gippsland. It is also found in New South Wales. It favours dry situations with sandy or stony soil generally of granitic origin.

P. procumbens is usually a rounded, rather procumbent shrub, less than 1 m high, although an erect, much taller form occurs in the Reef Hills near Benalla. The leaves are lanceolate, rhomboidal or occasionally linear, 4-10 mm long and 1-4 mm wide, tapering into a long, pungent point and strongly recurved. The leaf margins are incurved and both surfaces are sparsely villous with hairs somewhat thicker at the edges.

The pale brown, lanceolate stipules are 3-4 mm long, tapering to a slender point and with a conspicuous mid-rib.

The axillary flowers are bright orange with a brick red keel. The broad standard is 9 mm high and 11 mm wide and is slightly marked with red lines in the throat. The calyx is 7-8 mm long with rather sparse hairs which are thicker at the edges of the lobes. The upper lobes are broad with oblique tips and slender points. The lower lobes are acute with long slender points.

The bracteoles are three-lobed, attached just above the centre of the calyx tube and reach about half-way up the calyx lobes. There are no floral bracts. The ovary is glabrous except for a tuft of long white hairs at its summit; the long, slender style is also glabrous.

The mature pod is held well within the calyx, with the style forming a brittle curl at the tip, which makes the fruit rather similar in appearance to that of *P. foliolosa*. Flowering time in Victoria is from mid-October to mid-November.

A form of *P. procumbens* which occurs in the Beechworth hills has leaves which lack the pungent point. Willis (266:1972) comments that this plant shows a transition towards *P. foliolosa* which occurs in the same area. The two species appear closely related, having similar bracteoles and ovary, and the possibility of hybridization cannot be overlooked.

SPECIMENS EXAMINED included: 4 km NNW Chiltern, *A.C. Beauglehole 43632*, 25.xi.1973 (MEL 527203); Jingallala R. area, *A.C. Beauglehole 35774*, 4.i.1971 (MEL 522248); Warrenbayne State Forest, S of Benalla, *T.B. Muir 3601*, 30.x.1964 (MEL 522258); Beside Old Coach Road near Mt. Pilot, *M.G. Corrick 5980*, 29.x.1977 (MEL 524875); SW slopes of Pine Mt., *J.H. Willis*, 17.xi.1964 (MEL 522249).

Natural History Medallion Fund

Amount invested March 31	$556.00
Mrs Ellen Lyndon	10.00
Clarence Valley Field Naturalists Club	5.00
"Angair" Anglesea Aireys Inlet Australian Society	20.00
Society for Growing Australian Plants Melb. (2nd donation)	50.00
Mr J. R. Wheeler	10.00
Mr R. C. Anderson & G. R. Edwards	5.00
Total	$656.00

Geology of the Pilot Range, Beechworth, Victoria

BY IAN D. BUCKINGHAM* AND MARTLAND S. JOSHI*

Abstract

The Pilot Range batholith is a heterogeneous body emplaced in the epizone by the mechanisms of large scale piecemeal stoping and cauldron subsidance, followed by small scale stoping. The batholith was fairly crystalline during emplacement; hence the host Upper Ordovician sediments show contact metamorphism to a limited extent. The original adamellite magma has undergone differentiation and potash enrichment giving rise to granitic and aplitic variations. The adamellite intrusion was followed by granites and lastly the aplites. The late stage granitic fluids are present as dykes occupying the cracks in the cooling magma. The "granites" show post kinematic features (Post Benambran orogeny). Cassiterite mineralization is the main feature of the Pilot Range Granites, being restricted mainly to the greisened portion of the batholith.

Introduction

This report encompasses the study of approximately 40 sq.km. represented on the Beechworth, Victoria, 1:50,000 toposheets 8225-111. Field mapping was carried out during May and September 1972 and April 1973 (I.D.B.) on aerial photographs: Wangaratta 1:50,000, Run 3, photographs 98, 99 and 100 and toposheet 8225-111.

The township of Beechworth is located approximately 276 road kilometres from Melbourne and 35 road kilometres east of Wangaratta. The area under study is approximately 40 sq.km., with the township of Beechworth located in the southern section (Pl.1).

*Royal Melbourne Institute of Technology

Over 70 rock specimens were collected on a grid system for petrographic study. Also over 200 measurements of attitudes such as strike and dip of bedding planes and joint planes were recorded against their grid references, using compass and clinometer.

Geological Setting and Age of the Pilot Range Granite

The Pilot Range Granite is intrusive into sediments of (?) Upper Ordovician age and is overlain in parts by tillites of the Lower Permian age.

The regional NNE-SSW strike of the Ordovician sediments along the central part of the Lachlan Geosyncline (Cochrane 1971), was first developed during the Benambran orogeny (epi-Ordovician).

A potassium-argon age determination of a granite sample from the Beechworth area yielded an age of 365 million years (Everden & Richards 1962). However, as the rock was weathered they were doubtful of the accuracy of the result and tentatively correlated the rock with the older granites of the Bowning orogeny. Although they have not found the exact age, they have proved that the granite cannot possibly be younger than Upper Devonian.

Skeats (1931) considered the Pilot Range Granite to be of a Lower Devonian age because of its tin bearing nature, and hence its possible relationship with the tin-bearing acid granite dykes and veins of Mitta Mitta and Bethanga, which are part of the main metamorphic belt.

In his discussions on the Victorian Goldfields Mineral Province including the Pilot Range Granites, Hills (1965) includes tin with the metals that were introduced during the Cerberean Epoch of ore deposition during epi-Upper Devonian time.

The Pilot Range Granite shows post kinematic features. Briefly, these features are that the most abundant potash feldspar is an extremely perthitic orthoclase, microcline is well cross hatched, a very high fluorine content and tin which generally occurs in post kinematic granites (Marmo 1971).

Therefore by definition and characteristic mineral assemblages, it would seem that the Pilot Range Granite is post-Bowning orogeny, and therefore an age of 365 million years as determined by Evernden & Richards could be correct.

Location and Extent of the Area

Physiography

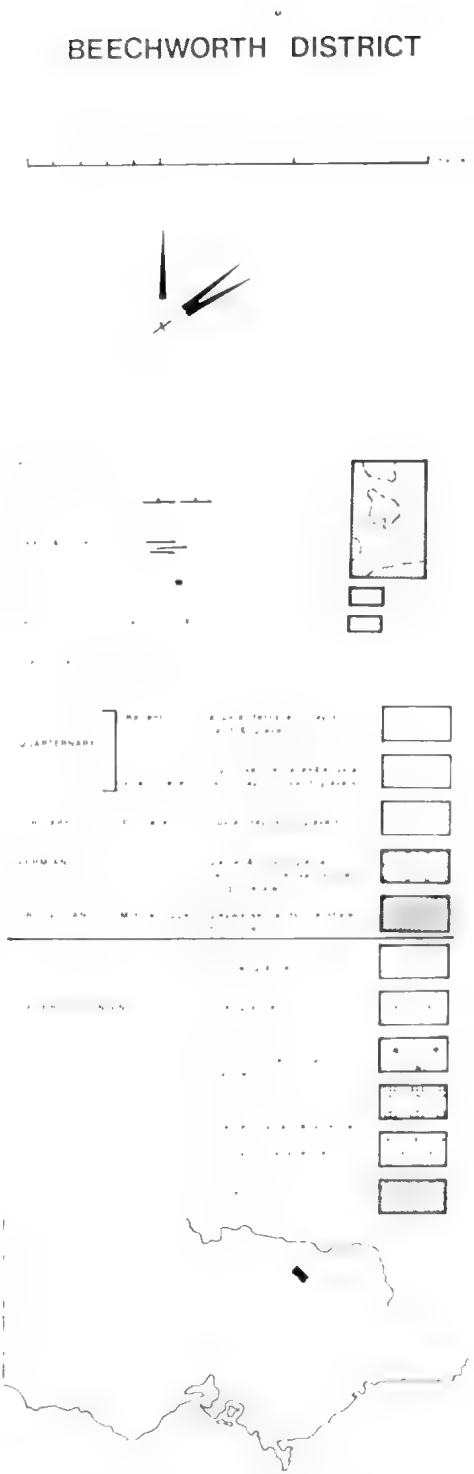
The major topographic features of the district are the Pilot Range to the north-west of the township of Beechworth and the Woorragee Range to the east. The Pilot Range is comprised mostly of granite and rises to a maximum elevation of 540 metres at Mount Pilot. The Woorragee Range is made up of Ordovician sediments. It extends southward from Woorragee and gradually rises to over 900 metres, the highest point being Mount Stanley — 1008.3 metres above sea level, 16 kilometres south-east of Beechworth.

The area is dissected by numerous streams which are controlled by local structure, of which Reedy Creek forms a major unit. Reedy Creek is formed by the confluence of the Woorragee and Spring Creeks and flows in a westerly direction.

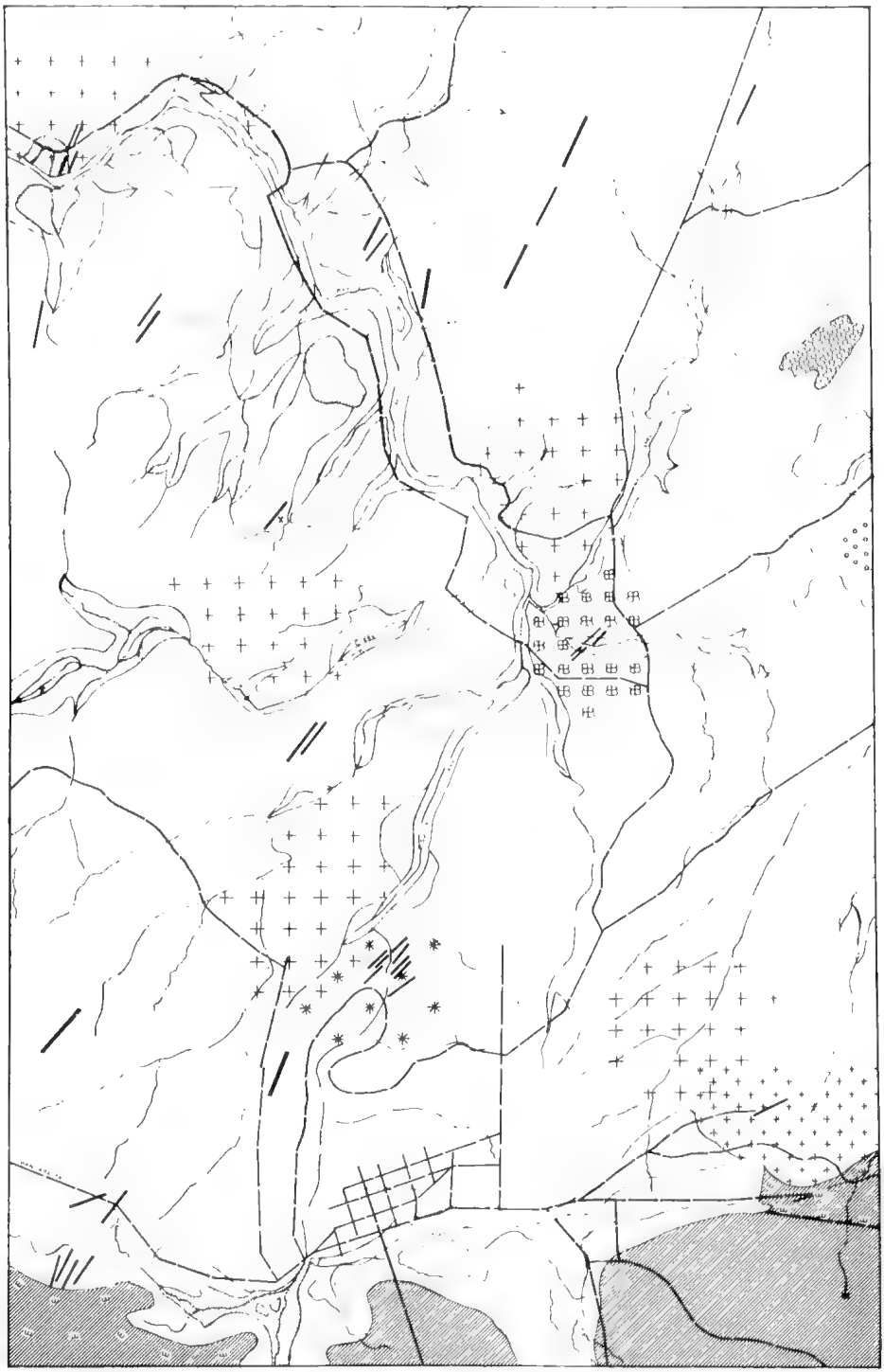
Most of the streams in the Pilot Range run through steep v-shaped valleys indicating them to be still in the youthful stage. However, Dunn (1913) considers them to be of mature age. They are accompanied by narrow alluvial flats.

Vegetation

The granite area is largely reserved as State Forest, with a few patches cleared for sheep and cattle grazing. The predominant variety of vegetation over the area is generally the Murray Pine, or, as referred to in some states, the Native Pine. This tree is known to grow in very acid soils, which



In the map opposite, Beechworth is at bottom centre, indicated as a built-up area.



would account for its occurrence over the entire area.

One striking point about the tree is that although it grows all over the area, it has a tendency to grow thicker over quartz porphyry, quartz-feldspar porphyry and aplite dykes, in which case marked lineations can be picked up from the aerial photographs.

History

The Beechworth area was one of the largest producers of gold and has yielded the major part of tin ore produced in Victoria. A number of lodes have been prospected in the area, but practically all the tin has come from alluvial workings along Reedy Creek and its numerous tributaries.

In the 1850s, rich shallow alluvial gold was discovered on Spring Creek just north of the present township of Beechworth (Reid 1905). A gold rush soon developed and, in the following years, mining extended rapidly upstream on Spring Creek and downstream along Reedy Creek.

Exploitation of the gold-tin deposits occurred in several distinct phases. The earliest mining was carried out by small groups of miners by means of shafts, tunnels or ground sluicing. Their workings covered many miles of recent alluvial flats as well as Pliocene-Pleistocene alluvial terraces. Many small sluicing companies were formed, and often the same rich ground was worked profitably several times.

Where Reedy Creek emerges from the western side of the ranges near Eldorado, the depth of alluvium rapidly increases from 20 metres to 60 metres. A new phase of mining developed in this area, with a number of public companies sinking relatively deep shafts and using powerful pumps for de-watering (Dickers Mining Record 1867; Hunter 1909).

In 1899 the Cocks Pioneer Electric Gold & Tin Sluicing Company was formed in order to re-work the Eldorado alluvium by means of a gravel pump mounted on a barge (O'Malley 1936).

The recent rise in tin price has enabled several syndicates to successfully carry out small sluicing operations.

Previous and Present Investigations

Most of the early investigations of the Beechworth and Woolshed Valley regions were carried out by Dunn* between 1871 and 1913, and Baragwanath from 1946-1948 kept his reports basically to the history of the area and descriptions of the Woolshed Valley. The latest report on the Pilot Range petrology of the granitic rocks of the Pilot Range is found in the Geology of Wangaratta Region (Leggo 1964).

There has also been considerable exploration activity for new deposits. The most extensive programme was carried out by North Broken Hill Pty Ltd during 1965-1967, when many alluvial flats in the Eldorado and Beechworth districts were tested. The latest companies to take out exploration licenses in the area are Mining Pty Ltd and Newmont Pty Ltd (E.L. 4915), Leighton Mining Pty Ltd (E.L. 436), and Geosearch Pty Ltd (E.L. 488) which are presently engaged at working upon the licence area.

Pilot Range Granite Complex

Introduction

This is a preliminary report on the geology of the Pilot Range. Detail mineralogy, petrology and chemistry of these rocks will be discussed in later communications.

The Pilot Range Granite Complex forms a large batholith of approximately 700 square kilometres in extent and is bounded on the south by the township of Beechworth, on the west by Eldorado, and 3.2 kilometres north of the northern extremity of the batholith lies the township of Chiltern.

The batholith has an east-west elongation of 32 km, while the north-south extent is about 22 kilometres. Although there are numerous tors of granite rocks in the area, fresh rocks were found along Spring Creek, Reedy Creek, in recent road cuttings on the Beechworth-Chiltern and the Beechworth-Wangaratta Roads, and the Gorge

*b/w 1871 and 1913, who kept his reports basically to the history of the area and descriptions of the Woolshed Valley, and Baragwanath from 1946-1948.

Road near Beechworth.

The batholith is composed of several different varieties of biotite granite. Great difficulty was experienced in trying to delineate the boundaries of the different variations and the reasons for this are best summarised by Leggo (1964):

I. It seems that gradations exist between the variations,

II. The variations do not have marked differences and owing to the severe weathering, these frequently could not be discerned,

III. There is a lack of exposure in some critical areas, and

IV. There are complications due to an abundance of dyke rocks.

Granite Types

The granite pluton consists essentially of a biotite granite and its variants. Six main types of granite were distinguished in the Pilot Range batholith.

The biotite granite, being the most common type, is found throughout the massif. It is a coarse-grained, grey granite and contains abundant quartz, feldspar and biotite. The granite is slightly porphyritic. The best exposures of this granite are to be found in recent road cuttings along the Beechworth-Chiltern Road: Section BE-R-9. Fresh outcrops also occur along Spring Creek: Section BE-R-37, and along Reedy Creek.

A porphyritic adamellite was found in the vicinity of the source of the Rising Sun Creek (Beechworth Military Sheet, grid reference 705169) on the southern section of the margin of the batholith: Section BE-R-45.

A coarse grained adamellite, Section BE-R-47, was found in the vicinity of the junction of Spring Creek and Woorragee Creek (Beechworth Military Sheet, grid reference 658184).

A pink granite, similar in composition to the biotite granite but finer grained, was found scattered throughout the area under study, but according to Leggo (1964) this granite is restricted only to the southern section of the batholith. Good exposures of this granite variety were found at different localities along Reedy Creek, i.e. Sections BE-R-16, BE-R-21 and BE-R-31. Pink granite was also found in the vicinity of Racecourse Creek (Beechworth Military Sheet, grid reference 686160) Section BE-R-29 and Gimblets Creek (Beechworth Military Sheet, grid reference 653151) Section BE-R-19.

A porphyritic leucocratic granite was found only in one locality and outcrop was restricted. (Section BE-R-37 Beechworth Military Sheet, grid reference 663145).

Dyke Rocks associated with the Granite Complex

One of the most unusual features of the Pilot Range Granite Complex is its high proportion and variation of dyke rocks. These occur throughout the granite and are estimated to constitute at least 10% of the total outcrops (Leggo 1964).

Dyke rocks include: quartz porphyry, felspar porphyry, quartz-felspar porphyry, granite porphyry, granophyre, pegmatite and aplites. All these rock types show textural and mineralogical variations.

Leggo (1964) states that "relationships between dyke rocks, as well as between the latter and the enclosing granite, are difficult to resolve, both on account of the complexity of the dykes and also because of the lack of good exposures".

Very few dyke rocks show clear intrusive relation with the granite by their chilled margins and sharp contacts. However, in the Beechworth Prison Pine Plantation, a definite transition from granite through to porphyry occurs and other transitions between dyke rocks are common.

During the measurements of dip and strike of the dyke rocks it was noted with few exceptions that the dykes were shallow dipping and the general trend of strike was NNW-SSW. This general strike was also encountered in the dykes situated in the Ordovician country to the south-east of Beechworth.

The pegmatites are generally small in size and occur most frequently as lenses or pockets. At one locality (grid reference 657198) pegmatite occured as a large pocket some

300 metres in length.

Petrology of the Dyke Types

Quartz-Feldspar Porphyry: This is a porphyritic, allotriomorphic granular rock with quartz phenocrysts in excess of perthite phenocrysts. These are set in a matrix of quartz, perthite, occasional plagioclase felspar, biotite and rare muscovite. The phenocrysts are up to 5 mm; the grain size of the matrix is always less than 1 mm. Carlsbad twinning of the perthite is common, as is kaolinization.

Plagioclase feldspar varies from albite and oligoclase and the albite law of twinning is always followed. Quartz is always highly fractured and undulose extinction is common.

Biotite is usually scattered sparsely through the matrix. It is the normal light-brown to red-brown pleochroic halos. In section BE-R-4, apitite is seen as inclusions in quartz.

Quartz & Feldspar Porphyries: The minerals present in these dykes are almost identical to that of the quartz-feldspar porphyry, the difference being, in the case of quartz porphyry dykes, perthite is absent and in the case of felspar porphyries, quartz phenocrysts are absent.

Granite Porphyry: It has a similar mineral assemblage as in the quartz-feldspar porphyry. However, section BE-R-D5 shows that it is coarser grained and slightly more porphyritic. It consists of irregular grains of quartz, perthite and a little oligoclase (small phenocrysts up to 2 mm) and much altered biotite in a ground mass composed of a fine mosaic of quartz, orthoclase and biotite.

Granophyre: A thin section of granophyre No. 1452 (Dunn 1913) from the Victorian Mines Department was obtained. The granophyre is composed almost entirely of intergrowths of orthoclase and quartz. The quartz occurs as minute hair-like intergrowths. The periphery of the feldspars is often marked by a coarse intergrowth of the two minerals.

Aplite: The aplite of section BE-R-2 is a quartz-perthite rock with albite-oligoclase muscovite and biotite. The perthite and quartz appear to have crystallised simultaneously giving rise to what Leggo (1964) has described as a xenomorphic granular texture. The grain size never exceeds a millimetre.

Genesis of the Dyke Rocks: It is known that after emplacement in the crust, a body of magma will begin to cool more quickly in the upper and outer portions. As it becomes solid, it breaks up by contraction into jointed masses. As the cooling and the crystallisation of minerals from the magma go on, the volatile components of the magma, beyond those retained by the minerals that use them in their chemical composition, become concentrated in the still liquid portion of the magma and as they accumulate more and more, their pressure increases enormously. Consequently they tend to force their way upwards along the fissures in the surrounding rocks.

At 374°C water reaches its critical temperature; that is, at this temperature or above, its vapour cannot be turned back into liquid merely by pressure, however great the pressure may be. As the temperatures of magmas greatly exceed the critical temperature of water, water must therefore be in the gaseous state when it escapes from the magma in which it is contained. Such super-heated steam can dissolve and carry silica and other substances in gaseous solution.

From a magma highly charged with water the minerals would crystallize somewhat differently from the way they would from normal magma. In some places the magma might have only moderate water content and the results would approximate those obtained in the main body of magma. If the water content is diminished by escaping into the wall rocks, the magma would solidify as an aplite. With the presence of volatiles in the cooling body the constituent minerals crystallize into magacrysts giving rise to pegmatites.

Finally, the ichors may be depleted of most of its constituents in quartz veins. Hence, aplites and pegmatites are essentially alike in composition, except for the

greater abundance of pneumatolytic minerals in pegmatites; and pegmatites have the ability to undergo more extensive recrystallization and replacement of older by younger minerals.

Both rocks may occupy sharply defined fractures, and both, but particularly pegmatites, may form replacement bodies with indefinite margins, which would explain the irregular lenses and pockets of pegmatites encountered in the Pilot Range Granite. Thus, we may visualise how quartz-feldspar, granophyre, aplite, pegmatites of variable composition, and quartz veins may be formed. It will also suffice to explain to some degree the gradational contracts which sometimes occur between dyke rocks and between dyke rocks and granite.

Perhaps the best way of discussing the difficulty in resolving the dyke forms is from the angle of proving that the batholith has just been de-roofed; and knowing that the dykes in the roof section of batholiths are in general flat lying, it would thus in the case of large dykes where outcrop was poor, be difficult to detect the contact relationships of the dykes.

Evidence to support the hypothesis that the Pilot Range Granite has just been de-roofed comes in the form of the large quantities of dyke rocks, the presence of volatiles in the form of tourmaline, topaz, fluorite and cassiterite, and the fact that the alluvium through the batholith is rich in tin.

The mineralised greisens are concentrated near the roofs of the granites and the richest alluvial concentrations (of tin) are found in the vicinity of granite intrusions which have undergone only shallow erosion (Leggo 1964).

Contact with the (?) Upper Ordovician Sediments

Only one third of the zone of hornfels (granite-sedimentary contact) is exposed in the area, the rest being covered by alluvium.

On the north-east flank of the batholith, emplacement has been controlled by an arcuate fracture. A slight change in strike of the bedding is apparent around the contact, but the latter is still discordant. The slight irregularity is probably due to emplacement along an original fracture zone. Piecemeal stoping of this area could have caused the minor irregularities.

To the north of the area studied in the present report, the contact runs along the Indigo Valley. The contact is straight, and almost concordant with a strike of 335°. "The contact appears to be slightly transgressive and this, combined with the lack of effect of the rather variable bedding attitude on the straight contact leads to an assumption that the intrusion has utilized in its emplacement what is almost a strike fault (Leggo 1964)."

Granitic dykes occur in the Ordovician sediments in the north-west section of the batholith, striking approximately parallel to the main trend of the contact.

Along the cuttings of the old Beechworth-Wangaratta railway line north of the township the rocks of the contact aureole are best exposed. Large, manganese-stained quartz veins, some up to 10 cm wide, can be found penetrating into the hornfels forming the aureole.

Petrology of the Contact Aureole: The rocks of the contact metamorphic aureole range in composition from biotite-muscovite schists to meta-siltstones, shales and sandstones in the sections studied.

The metasediments have lost most of their primary features in the contact metamorphic aureole, by microfolding, cross-shearing and also by the formation of medium grained porphyroblasts (now fine muscovite). At places fine laminations in the hornfels seem to represent primary bedding. Evidence of shearing and distortion varies from pronounced (thin section BE-R-43) to negligible (thin section BE-R-44). This suggests early shearing associated with granite intrusion followed by low stress (contact) metamorphism. There is also evidence of post biotite muscovitization. The biotite may represent, at least, in part, recrystallized sedimentary material — the muscovite perhaps being a metasomatic alteration product.

Hornfels (BE-R-43) is a weathered contorted and veined biotite-muscovite schist.

The sample consists of muscovite, biotite and quartz. A small quartz muscovite vein cuts the sample. This appears to have been a shale which during metamorphism suffered contortion and minor brecciation, veining and formation of porphyroblasts and alteration of porphyroblasts to fine muscovite in that order.

Hornfels (BE-R-44) is a meta-silt-stone-shale consisting of alternating laminae of fine granular quartz with a small amount of interstitial biotite and muscovite and a trace of magnetite and zircon, and fine-grained randomly orientated biotite associated with minor quartz, and cut by minute randomly orientated needles of muscovite.

The fine bedding in this sample is very irregular and lenslike with some evidence of cross or current bedding.

A meta-greywacke or poorly sorted sandstone (thin section BE-R-46) consists of angular quartz and minor albite fragments in a fine, granular matrix of quartz, muscovite, biotite and minor felspar.

The sample is cut by thin irregular zones which are identical to the matrix but richer in biotite and muscovite, and within these zones there is a suggestion of a foliation which has been partly modified by later, low-stress recrystallization. It would seem that they are the product of an early irregular shearing stress.

Meta-shale (section BE-R-48) consists of a fine grained foliated mixture of biotite, muscovite and variable amounts of fine grained quartz. The rock has a fine lamination and there appears to have been a direction of shear roughly parallel to the lamination and also one at a large angle to the lamination. A peculiar lens-like area, similar to the country rock but richer in quartz may represent a small, filled scour channel.

Also present are medium grained areas of essentially similar composition to the matrix. These also have an identical lamination to the matrix but this lamination is often at a small angle to the country rock lamination suggesting slight rolling. Perhaps these are areas of incipient porphyroblast formulation.

Xenoliths: The only xenoliths found in the Pilot Range Complex occur in a coarse-grained adamellite, (Beechworth Military Sheet, grid reference 695165). No xenoliths were found in the common biotite granite. The xenoliths are small, fine-grained, quartz-rich and contain felspar (albite-oligoclase and microperthite). The largest xenolith found measured 4 cm by 3 cm.

Faulting in the Pilot Range Granite Complex

Few faults have been recorded in the Beechworth District. This could be due to the poor exposures and the great thickness of alluvium covering much of the granite area. Dunn (1913) however, has described a post Tertiary fault at Beechworth and Leggo (1964) has also described a fault.

A Post Tertiary Fault: Dunn (1913) has described a fault at the upper end of Spring Creek. The fault cuts through the granite, altered Ordovician beds, and Newer Pliocene deposits of clay, gravel and auriferous wash dirt. It strikes at 40° and dips to the south-east at 45°, with uplift being on the southern side. The fault continues in a westerly direction to the Two Mile Creek.

The Newton Fault: Leggo (1964) has also described a fault at the upper end of Spring Creek near the falls. Leggo's fault is traceable for approximately half a mile on a strike of 70° from the falls. "Movement has occurred in both granite and dyke rocks (aplite, pegmatite and porphyries), and is usually represented by thin isolated mylonitic zones".

The continuation of the Newton Fault cannot be traced in the granite or the surrounding Ordovician sediments.

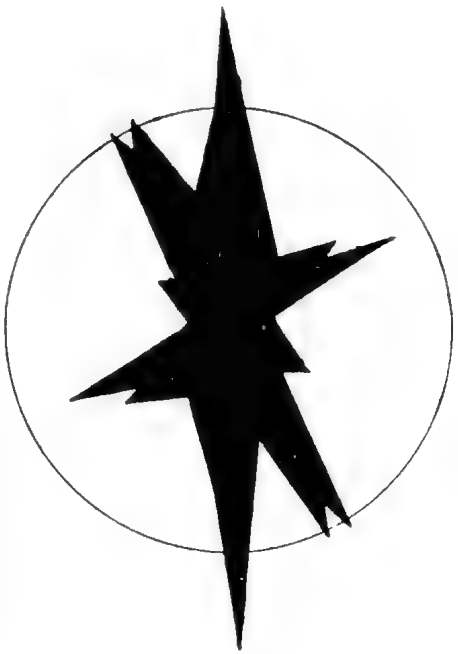
Minor Faulting and Postulated Faults: Near Spring Creek, just north of the bridge on the Gorge Road, a thin mylonitised zone was traced over a distance of about twenty metres through the granite; this fault has an average width of 10 cm and a strike of approximately north-south.

The brecciated dykes (Beechworth Military Sheet, grid reference 712164 and 660140) received the attention of some of the earliest writers. Dunn (1872) in his

report on enhydros from Beechworth, recorded a silicified fault breccia which, after the initial fracturing and entry of quartz, suffered further fracturing, followed by chalcedony infilling.

Dunn (1913) in his report on the Woolshed Valley at Beechworth has postulated a fault running along Spring Creek valley and its continuation up Snakes Head Creek towards Mount Pilot. Although stating that this looks remarkably like the course of a fault, signs of the fault could not be detected.

Jointing: The jointing in the Pilot Range was plotted from both contact measurements and aerial photographs. A rose diagram (Fig. 1) shows the major joint directions for the batholith. The variability in strike due to the slight inconsistency of magnetic north relative to the aerial photographs is small; the strikes determined from the aerial photographs differing by less than 5° from the actual contact measurements made in the field. Also, from the field observations it was found that the joints are usually steeply dipping; usually greater than 70°.



The figure shows that the jointing has a dominant strike of north and south. The other maxima having strikes of 155° ± 5° and 60° ± 5°, while minor maxima occur at 125°.

These principal joint directions can be correlated with those of the Kiewa Region (Beavis 1962). The direction of compressive strength 60° ± 5° could account for the observed jointing, this strike direction corresponding to the orientation of the principal compressive strengths determined by Beavis for the Bowning Orogeny. The strikes 155° and N-S can be correlated with the Bowning and Tabberabberan Orogenies respectively and correlate to tension fractures. The strikes 60° ± and 125° can be shown to the shears associated with the Tabberabberan Orogeny.

In general the joint pattern seems to run parallel to the contact between the granite and the Ordovician Sediments. Though most of the streams run straight there is some suggestion of their course being controlled by joint system.

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The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 75 in the previous issue)

BY JAMES A. BAINES

***Periballia.** Gk peri, around, near; ballo, to throw; perhaps in allusion to the seeds. Our species, introduced from the Mediterranean region, is **P. minuta*, Small Hair-grass, classified in *Aira* from 1753 to 1899.

***Petrorhagia.** Gk petros, a rock; rhagas, rent, chink (from rhegnymi, to break asunder); equivalent to Lat saxifraga, stonebreaker. Our two introduced species are Hairy Pink and Proliferous Pink. Both species were first classified in *Dianthus*, then in *Tunica* (Lat tunica, garment, tunic; cf. tunicates in marine biology). They belong to family Caryophyllaceae.

***Petroselinum.** Gk petros, rock; selinon, parsley or celery, i.e. wild parsley. **P. crispum*, Parsley, is sporadically naturalized. The French name Persil, the German Petersilie, and English Parsley are all forms of the same Latin word. The genus is in family Umbelliferae, which has an alternative name Apiaceae, derived from *Apium*, in which genus our species was first placed.

Erratum Note

Caesia. 'Vict. Nat.' 91: 165, June, 1974. Delete the paragraph giving derivation from Latin caesius, bluish-grey, and insert the following in its place:

Caesia. Named by Robert Brown in 1810 after Federico Cesi (Caesius in Latin), an Italian botanist of the first half of the 17th Century. He was first to discover the purpose of fern spores, and wrote 'Tabulae Philosophicae', Rome, 1651. His surname comes from Lat caesius, meaning bluish-grey.

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Introduction to Foraminifera

BY K. N. BELL*

A group of animals seldom seen or studied by field naturalists is the Foraminifera. These are microscopic (0.1 to 2.00mm) single celled animals or Protista which differ from the *Amoeba* in having a hard shell or test. To appreciate the beauty of these animals a microscope with magnification of 10 to 30 is needed.

Foraminifera are marine animals. The benthonic or bottom dwelling forms may be found in mud-flats in the intertidal zone, attached to algae, in estuarine conditions in the sands, in the deepest waters of the oceans. The planktonic or free-floating forms are to be found in the upper water levels in the open oceans but after death their tests fall to the sediment on the ocean floor. I will not consider the planktonic foraminifera any further as their study is rather specialised.

Types of tests (shells)

The tests of foraminifera are of 3 types. The arenaceous tests are usually formed by the cementing together of various sized quartz grains although other mineral grains may be used and some deep water foraminifera use sponge-spicules laid side-by-side to make their tests. The common arenaceous forminifera in Victorian waters are *Textularia, Ammobaculites, Miliammina, Reophax.*

The other two types of test are both calcareous (made of calcium carbonate) — the one having an imperforate test (apart from the main aperture) known as the Miliolina which includes *Quinqueloculina, Pyrgo;* the other having a perforated test (very minute openings) known as the Rotaliina which includes the genera *Ammonia, Brizalina, Uvigerina, Elphidium, Cibicides, Spirillina.*

The test consists of usually a series of chambers which may be arranged in a uniserial, branching, conical, spiral, or globular fashion but some consist of only one chamber which may be globular, spiral, flask-shaped, spindle-shaped, branching or uniserial. In all cases the outside of the test may be smooth, pustulose, ribbed or with other sculpture form.

Collecting

Collecting these animals is very easy. By scraping a small open-mouthed vial over the top 2-3 cm of muddy sand on *"Zostera"* flats in the intertidal zone specimens of many species will be found. At Flinders, Western Port, samples may contain up to 70 species (mostly calcareous forms) but at Tooradin in the mud flats only 4 or 5 species will be collected (mostly arenaceous forms). Samples from weed-covered shallow-water muds in Queensland have yielded 15 species of arenaceous forams while samples of the fine sands on the Great Barrier Reef will yield over 150 species of the calcareous species. Do you know someone with a boat? Good — because mud scrapings from the anchor will yield a fine fauna of the different species to be found at varying depths. Algal fronds of the smaller species like *Zostera* and *Cymadocea* often have forams attached to them, sometimes camouflaged with a covering of sand grains. Even the filamentous algae may have species entangled e.g. from Hastings, Western Port, a slimy green alga had 250 specimens of 15 species present. The foram fauna varies from locality to locality, with different environments and the only niche usually without forams (except broken and worn specimens) are the mobile sands at the water's edge.

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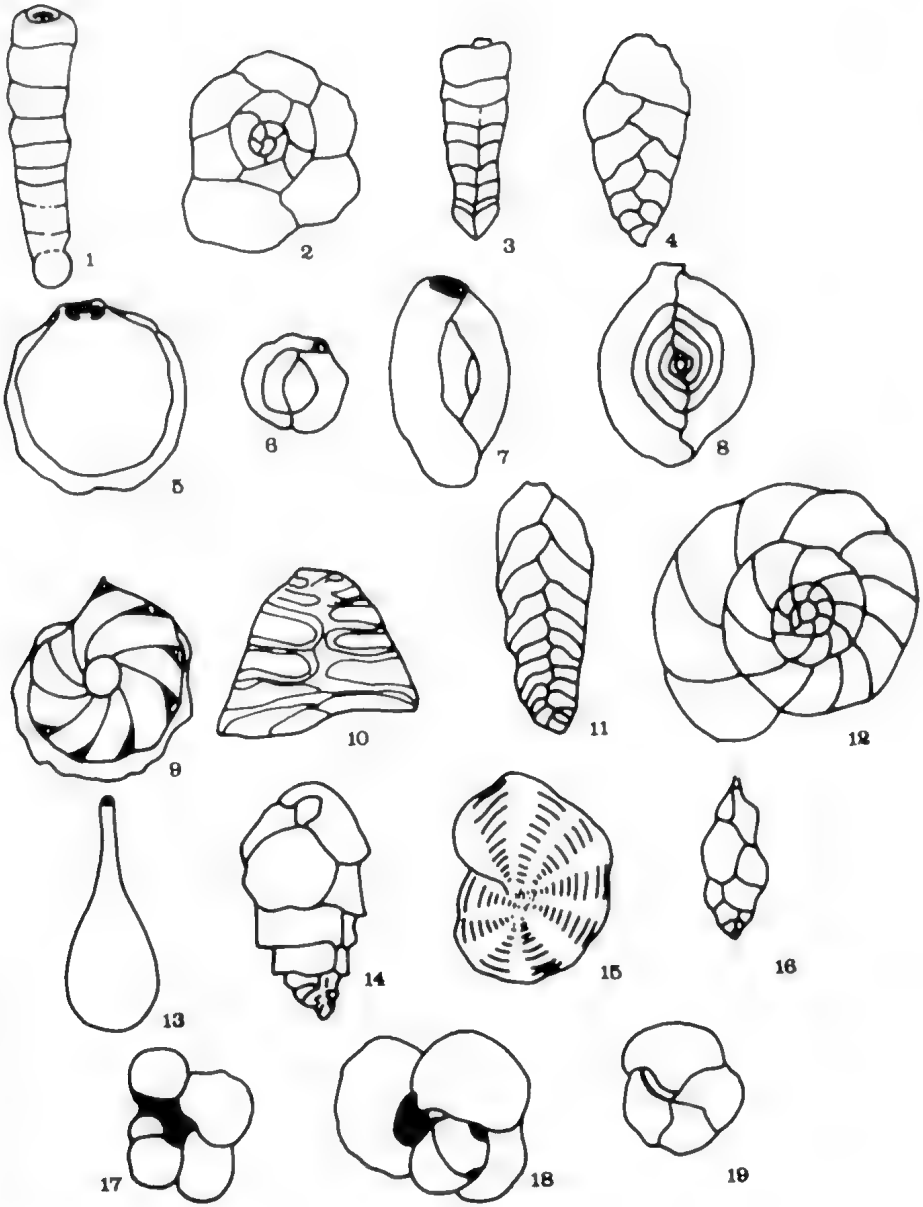

Plate 1 *Explanation of figure:*
Specimens to various scales.
Arenaceous forms:
1. *Reophax* 2. *Trochammina* 3. *Clavulina* 4. *Textularia*

Porcellaneous forms:
5. *Pyrgo* 6. *Sigmoilina* 7. *Quinqueloculina* 8. *Spiroloculina*

Rotaliid forms:
9. *Robulus* 10. *Patellina* 11. *Brizalina* 12. *Ammonia* 13. *Lagena* 14. *Bulimina* 15. *Elphidium* 16. *Uvigerina*

Planktonic forms:
17. *Globigerina* 18. *Globigerinoides* 19. *Globorotalia*

Preparation of Samples

Initially one would only be interested in observing the different species present without regard to their being alive at the time of collection or not. If so the samples of sediment are easily prepared. Spread the sample out very thinly over the bottom of a petri-dish or similar and examine in reflected light. Among the many sand grains you will soon find the forams. They can be picked out of the sample using a wetted fine camel hair brush (I use size 000) and glued onto a slide. Usually cardboard well slides are used although normal glass slides with a ring can be used which will enable you to study them by transmitted light as well. If there is much clay present in the sample wash the sample carefully by decanting until most of the clay-sized material is removed, then proceed as above. Samples can be washed through fine sieves to concentrate the forams and remove rubbish. There are other methods which can be found in the references listed.

Forams as fossils

Forams are also to be found as fossils. They range in time from Cambrian to Recent and are very common in the Tertiary limestones and marls in Victoria in such places as Port Campbell cliffs, Fossil Beach — Mornington, and the Lakes Entrance area. A normal Tertiary marl will provide over 200 species of both benthonic and planktonic species. Because of their relatively restricted ecological tolerances in the present day sediments, forams make very good palaeoecological indicators for the interpretation of the environment of deposition of these geologic sediments. The preparation of fossil faunas differs from that of Recent ones. The sediment sample (about 10g) needs to be boiled with a small quantity of "Calgon" or sodium carbonate until it becomes well broken down (usually about 30 mins.). Either then wash through fine sieves or decant carefully, washing well as for the Recent faunas.

Biology of forams

Little is known of the biology of living forams. They apparently feed on diatoms and unicellular algae which become entrapped in the protoplasmic net surrounding the foram test. They have a complex reproductive cycle consisting of 2 (some researchers believe 3) alternating generations but only some 30 species out of an estimated 6000 living species have yet been studied in the laboratory.

The place of forams in the trophic structure of ocean life is as yet poorly known but it is known that they form a large part (perhaps even exclusively) of the diet of some *Retusa* species in Victoria (shelled opisthobranchs) and overseas research has shown them to form part of the diet of some tube-worms. There is obviously much to be learned about the biology of living foraminifera.

Identification

The identification of forams is relatively easy to genus level. To go to species level is more complex as access to a library with specialist research papers is needed. Some of the more common forams in Victoria are figured in Plate 1.

References

The best reference is the Treatise of Invertebrate Paleontology, Part C (Univ. of Kansas, 1964, Loeblich, A. R. and Helen Tappan) which lists and describes all genera and gives figures of most of them. An earlier handbook to the genera is Cushman, J. A., 1950, Foraminifera (Harvard Univ. Press) which gives good figures and descriptions of the genera although the names are not all up to date.

Albani, A. Handbook No. 1, A.M.S.A. is a good guide to the more common N.S.W. forams but many occur in Victoria.

The fauna of Port Phillip Bay has been monographed by A. C. Collins (Memoir No. 34, National Museum of Victoria) but of the 278 species only 48 are figured.

From these references the interested worker in forams will find many further articles as an aid to preparation and identification.

A note on the pouch life of rock wallabies

By P. E. Hornsby*

The usual pattern of behaviour amongst the joeys of the larger macropods is for them to have an extensive 'interim' period of pouch life — that is, the period between the time when the joey leaves the pouch for the first time and when it is permanently out of the pouch. For example, Kirkpatrick (1965) quotes pouch young of the grey kangaroo *Macropus major* (Shaw) as first leaving the pouch at 250 days, and permanently out of the pouch at 297 days (giving an interim pouch life of 47 days) while Poole (1975) quotes an interim duration for 35 days for the same species, and 25 days for the western grey kangaroo, *M. fuliginosus*. Sharman and Pilton (1964) reported an interim pouch life of 36 days for the red kangaroo *Megaleia rufa*, and Russell (1973) gave a figure of 56 days for the smaller species *Macropus eugenii*, the tammar or dama wallaby.

This interim period is then followed by a protracted 'at foot' stage when the joey accompanies its mother on her travels.

The behaviour of at least two species of rock wallabies and probably all or most of the others, differs markedly over both of these periods. Recently, records have been made for two of the latest yellow-footed rock wallaby, *Petrogale xanthopus*, joeys (both male) to be raised at the Adelaide Zoo. The first joey had an interim pouch life of only ten days, being observed to first leave the pouch on September 12th 1977, and to be permanently out as from September 22nd 1977. The second joey, conceived when its mother was approximately sixteen months old, had never been observed out of the pouch before 14.11.77, and was permanently out by 21.11.77, a maximum interim pouch life of seven days. (One possible reason for the short duration is that the mother was still not fully grown herself.)

Female yellow footed rock wallaby.

These short-duration pouch lives resemble that observed earlier in the related species *P. pencillata pearsoni*, the Pearson Island rock wallaby. In this instance, the joey, also a male at Adelaide Zoo, was observed to first leave the pouch on 15.9.74, and definitely recorded as permanently out of the pouch by 6.10.74, though it is extremely likely that the final eviction had taken place before this later date.

The behaviour of the joeys of both species shows only marginal differences from one another during the post-interim stage but both differ substantially from the conventional 'at foot' process. In the case of the Pearson Island wallabies at the Zoo, this can best be illustrated by considering the behaviour over a twenty-four hour period, starting early in the morning. The mother would suckle her joey for some time, fol-

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Fig. 1. Pearson Island rock wallaby joey resting alone in a log at the Adelaide Zoo.

Fig. 2. Yellow footed rock wallaby joey resting alone on a rock in the Flinders Ranges, South Australia.

Young eagle diving over wallabies at Hamiltons Creek

lowed by each animal grooming itself, plus some grooming of the joey by the mother, together with some mutual play behaviour. The mother would then depart, and the joey would adjourn to its resting point, in this instance, a hollow log (see figure 1) where it would remain all day. Meanwhile, its mother would retire to her favourite resting place on the main rock pile in the enclosure. Towards dusk the joey would emerge from the log and the mother would come and collect it, and together they would adjourn to the rock pile, where the joey would again be suckled. Then, after grooming and play, both would go off and feed together.

A similar pattern of behaviour occurs in the native habitat on Pearson Island, though this is necessarily more complex because of interactions with other wallabies. However, as regards this post-interim behaviour, the basic characteristics are the same.

The comparable behaviour is somewhat easier to observe in the case of the yellow-footed rock wallaby in its natural habitat, because of a lesser propensity to retire underground during the daytime. Here the daily cycle is essentially the same, with the mother leaving her joey in a 'safe' place while she goes off to feed, drink, or rest elsewhere. This safe spot is normally well within the home range of the colony, and so the 'abandoned' joey is nevertheless quite safe because it can rely on warnings by others in the case of danger. If for some reason it has to leave its chosen spot, it will endeavour to return later to the same place. However where numbers have been reduced, this tendency to sit out in exposed places (see figure 2) must make it particularly vulnerable to its natural enemies such as the wedge-tail eagle, *Aquila audax*, and introduced exotics like the feral cat, *Felis catus*.

Free-ranging joeys of both species exercise a certain degree of licence with regard to the spot where they have been left, wandering about to graze and interact with other conspecifics, playing and fighting with their peers, but they never show anything resembling the stereotyped 'at foot' behaviour of the more nomadic macropods.

Acknowledgements

I am indebted to Richard Oglesby, on the staff at the Adelaide Zoo, for the record of dates regarding the first *P. xanthopus* joey, and to the Director and Board of the Adelaide Zoo for permission to observe the animals outside normal working hours.

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Reply from Elizabeth Turner

Dr. Michael Messer PhD, Senior Lecturer in Biochemistry at the University of Sydney, has kindly called my attention to some errors in my article "Preventive Marsupial Paediatrics" (Victorian Naturalist, 94, 3 129 May/June 1977) and I thank him for his concern and information.

These new facts are most interesting and very recently published and indeed were not available to me at the time of writing my article and I relied for my references on Stephens et al (1974-75) as published in the "References".

On the question of whether marsupial pouch young can metabolize dietary galactose, Dr. Messer points out that Stephens' findings of low activity of the kinase and transferase enzymes in the red blood cells of red and grey kangaroos was obtained on:

1. adult kangaroos, not on pouch young, and
2. that galactose would be metabolized by the liver and not the red blood cells.

Dr. Messer is unable to supply any references of published material on the levels of activities of galactose-metabolizing enzymes of the livers of infant marsupials.

He has misunderstood my statement in paragraph 4, page 130, as he points out that marsupial milks do indeed contain some lactose. I stated that "the predominant carbohydrate is not lactose" and that the giving of "high lactose containing milks produces diarrhoea".

Dr. Messer states that "quite significant amounts of galactose-containing saccharides have nevertheless been found in the milk of several species of marsupials. This was first demonstrated by Gross and Bolliger (1958, 1959) for the brush possum and confirmed by Jenness et al (1964) for the quokka, red kangaroo and American opossum."

He then kindly included a reprint of his own recent paper "Milk carbohydrates of Marsupials. Partial Separation and Characterization of Neutral Milk Oligosaccharides of the Eastern Grey Kangaroo" (Messer and Mossop. Aust. J. Biol. Sci. 1977 30, 379-88) in which he has shown that the milk of the grey kangaroo contains a variety of saccharides of various sizes, in each of which galactose is the predominant monosaccharide.

Finally, he cites the work of Kerry K. R. (1969) Comp. Biohem. Physiol 29, 1015, on "Intestinal disaccharidase activity in a monotreme and eight species of marsupials". Kerry examined the lactase activity of pouch young in one specimen of ring-tail possum and one of grey kangaroo and found it to be higher than in infant eutherians. This would indicate that in these two pouch young at least there would be no difficulty in digesting cow's milk, as suggested by the work of Stephens et al (1974) in their paper "Deficiency of two enzymes of galactose metabolism in Kangaroos" Nature, (London) 248, 524.

Dr. Messer states that "it seems unlikely that the cataracts sometimes seen in young marsupials would be related, causally, to those found in human infants with congential galactosaemia. In my view, the true cause of these cataracts remains to be discovered." Apparently conflicting theories and reports of the causes of the cataracts exist.

This is a disappointment to those of us who have noted the cataractous eyes of young marsupials and we await with some impatience the results of further research work by persons of the calibre of Dr. Messer and his colleagues, and do sincerely hope that these results may be published in journals which are more readily available to the non-specialist reader.

ELIZABETH K. TURNER M.D.

Field Naturalist trip to Mt. Buffalo

FNCV Excursion 27-1-78 - 3-2-78

BY JOAN FORSTER

On January 27th, 1978, 41 Field Naturalists left Spencer Street Station for a week at Mt. Buffalo, which Hume and Hovell named during their expedition from Sydney to Port Phillip Bay in 1824, because to them the mountain looked like a buffalo.

It was a novelty to be waiting on a crowded station for a train journey instead of setting out by bus. The last part of the journey however was by bus from Wangaratta. In the cold and dark the friendly bus driver entertained us with welcome tales of the Chalet and points of interest along the way.

After a cold night the first Saturday was pleasant for walking, then we had two days of heavy rain. Many members of the group braved the wet weather and we were grateful for the efficient drying room provided in the Chalet. By the end of the week and on our journey home the weather was almost too hot to be pleasant.

As we were not dependent on our own bus for transport members chose their own activities each day except for the Wednesday when a bus from the Chalet took us to the Horn.

Walks near Lake Catani

The walks in the area around Lake Catani and along the Gorge were popular with botanists who delighted in the abundantly flowering Burgan Tea-tree *Leptospermum phylicoides* and the Shrubby Platysace *Platysace lanceolata*. Though after the heavy rain those near the Chalet were almost de-flowered. An interesting feature of the Burgan was the varied length of the stamens. Some were much longer than the petals, some the same length and others very short indeed. These stamens protruded at various angles although they were mostly parallel with the petals.

The low growing bushes of Shrubby Platysace were very charming. The slightly domed flower heads were 2-3 cm across, each head consisting of many tiny white flowers touched with pink where buds occurred.

Helichrysum adenophorum var. waddellae. Photo by Ray Lee.

On the track to Lake Catani near the broad bridge were a few low-growing, sprawling bushes of Monkey Mint-bush *Prostanthera walteri*. The flowers were typical mint bush shape but 2-3 cm long, a pale greenish grey colour with purple veining on the upper petal; strangely handsome. The dark green leaves lacked the aroma characteristic of most mint bushes. Under the bridge Mountain Plum pine *Podocarpus lawrencei* grew, showing some pinkish mauve male cones. Here in the Myrtle Teatree *Leptospermum myrtifolium* there were Eastern Spinebills *Acanthorynchus tenuirostris* flitting from the growth below the bridge to the bushes on the bank. As they darted among the leaves you could catch a glimpse of the brown back, the white shafts of the tail, the black head and white throat

Buffalo Plateau. Photo by Zillah Lee.

with reddish brown patch in the centre. The clashing of the cobbler's awl — beak snapping at insects and the whirring of wings could be clearly heard.

Along the shady parts of the track Pale Vanilla-lily *Arthropodium milleflorum* was growing and it was interesting to taste the long stalked clusters of fruits on the Carraway *Oreomyrrhis eriopoda* growing near by. Round leaf Mint Bush *Prostanthera rotundifolia* had a few flowers and on the twining stems of the Common Appleberry *Billardiera scandens* there were immature green berries. Green immature fruits were also on the Waxberry *Gaultheria appressa*. Mountain milkwort *Comesperma retusum* was in flower and a narrow leaf form of Panax *Tieghemopanax sambucifolius* was in bud. Among the mossy boulders Fish-bone Water fern *Blechnum nudum*, Mother-shield fern *Polystichum proliferum* and Scrambling Coral fern *Gleichenia microphylla* added delicate beauty. In several places Royal Bluebells *Wahlenbergia gloriosa* were in full rich glory. The endemic Fern-leaf Myrtle *Baeckea crenatifolia* was recognised, though not in flower and hanging on the granite cliffs were little trailers of silvery leaved Cliff Cudweed *Gnaphalium umbicola*. Common Fringe Myrtle *Calytrix tetragona* had finished flowering but the tailed sepals persisted.

On the further side of the bridge the Royal Grevillea *Grevillea victoriae* showed rusty red buds and a few flowers. Lemon Bottlebrush *Callistemon pallidus* was beside the track and a large bush of Catkin Wattle *Acacia dallachiana* had catkin buds. The pungent Alpine Mint bush *Prostanthera*

cuneata was growing in shady places and we were delighted to see a few pink-tipped buds and white flowers of the Waddell Everlasting *Helichrysum adenophorum var. waddellae*.

The meadow along the north side of Lake Catani was a film consuming garden. There were photogenic clumps and spreads of big orange Billy Buttons *Craspedia glauca*, orange Everlastings *Helichrysum acuminatum*, Pale Everlastings *Helichrysum rutidolepis*, Alpine Podelepis *P. robusta* and Alpine Everlastings *Helichrysum hookeri*. On muddy flats pale blue flowers of mud *Pratia P. surrepens* were growing flat on the ground and purple Fairies' Aprons *Utricularia dichotoma* flowered above submerged bladder carnivorous leaves. Among the grass there were Scaly Buttons *Leptorhynchos squamatus*, while pink Alpine Trachymene *T. humilis* grew close to the ground. The heaths seen in wet places had ceased flowering — Coral Heath *Epacris Microphylla*, Swamp Heath *E. paludosa* and Candle Heath *Richea continis*, while Mountain Beard Heath *Leucopogon suaveolens* showed red berry-like drupes and Heath Milkwort *Comesperma ericinum* was in flower. Granite buttercup *Ranunculus granticola* showed its shiny yellow flowers and Rigid Buttercup *R. gunnianus* had heads of achenes above the much divided leaves.

In the same area Alpine Heath-myrtle *Baeckea gunniana* was covered with small Tea-Tree-like flowers. Baeckeas have fewer stamens than Tea-trees and they tend to bend over to the centre of the flowers.

At the end of this swampy area we saw a Wombat *Vombatus ursinus* feeding and resting in a grassy patch by the lakeside with a White-necked Heron *Ardea pacifica* near by and a Dusky Moorhen *Gallinula tenebrosa* feeding among the reeds. Later we saw a Black Cormorant *Phalacrocorax carbo* and a Black Duck *Anas superciliosa* in the same area.

The track from here is enclosed by flowering Tea-Tree *Leptospermum grandifolium*. These bushes were the haunt of White-eared Honeyeaters *Meliphaga leucotis*. Their loud 'Choc, choc' call draws attention to them as they move actively from bush to bush catching insects or sipping nectar. This handsome dark yellowish-green bird with grey crown, black face and throat and white patch behind the eyes spends a long time feeding in the same group of bushes, so it is easy to get a good sight of him.

The walk to Chalwell Galleries

On Saturday a small group of Naturalists decided to join a walking party from the Chalet. The destination was the Chalwell Galleries. The party consisted of about twenty people ranging in age from six to sixty years. For naturalists the leader moved too quickly with no stops for botanizing, but the climb was an experience we would not have missed. From the south end of the camping ground at Lake Catani the track led through a woodland of slender Snow Gums *Eucalyptus pauciflora* beneath which grew Mountain Shaggy Pea *Oxylobium alpestre* with a few yellow and brown pea flowers. There were patches of leafy Bossaea *B.foliosa* which had a few remaining yellow pea flowers amongst the masses of little flat brown legumes. Handsome Flat Pea *Platylobium formosum* and prickly Gorse Bitter Pea *Daviesia ulicifolia* had both finished flowering. In the camping ground under the trees we saw Cinnamon Bells *Gastrodia sesamoides*. At the edge of this area among the Snow Wallaby Grass *Danthonia nivicola* there were a few Snow Daisies *Celmisia asteliifolia*, Yellow Kunzia *K. muelleri* had some flowers and there were one or two flowers remaining on the long leaf Hovea *H. longifolia*.

The track then climbed gently until we reached the base of the Galleries. These were made up of a group of large boulders piled one on another. Here the leader said we should leave our bags as we would need two hands and the passages between the rocks would be too narrow to accommodate our bodies and our bags.

As we stretched from stone to stone down narrow defiles, climbed up through crevices between boulders or slithered down over slippery granite slabs we knew he had been

right. In one place the space between the boulders was so narrow that we had to progress backwards on hands and feet as we faced the sky, then insert ourselves with a twist upwards through a slit between the boulders. At last after much physical effort we came out onto a rock platform where we could look down over the Buckland Valley and across to Victoria's highest peaks. We were interested to see in the valley tobacco growing and the farm houses and curing sheds.

Mists

By Monday afternoon the rain had eased and many people ventured out along the tracks. All around us the mist hid the views, the nearer trees being silhouetted as twisted grey shapes against the white mist. By evening from Bent's Lookout a white lake engulfed the lowlands and wisps of cloud crept up between the mountains as in a Chinese painting until the mist rose at our feet engulfing us in a damp blanket.

The Gorge track next day in the sunlight gave us clear views over the chasm below and the opportunity to recognise Mountain Pepper *Drimys lanceolata*, Box Microntheum *M. hexandrum* with maturing capsules, Myrtle Tea-tree *Leptospermum myrtifolium* and Slender Tea-tree *L. brevipes* in flower. Also growing along the track were Alpine mint bush *Prostanthera cuneata* and Violet Kunzea *K. parvifolia*. Firewood Groundsel *Senecio linearifolius* looked bright beside the track and both Helichrysums that are often called Cascade Everlastings added dainty beauty with their showers of white flowers, *H. throideum* with shiny green leaves and *H. secundiflorum* with grey leaves. Catkin buds were seen on the endemic Buffalo Sallow Wattle *Acacia phlebophylla* and Alpine Wattle *A. alpina* was also budding.

A very large feral tabby cat was seen stealthily stalking prey on a boulder but it was gone like a flash when it realised we were near.

Trees around the Chalet

Round the Chalet area Mountain or Kindling Gum *Eucalyptus dalrympleana* dominated the scene and Buffalo Sallee *E. mitchelliana*, endemic to Buffalo was recognised by drooping narrow shining leaves and a pointed starry arrangement of its buds. Below these gums giving a blue-grey colour to the middle story were many Hickory Wattles *Acacia obliquinervia* with attractive blue-grey phyllodes and rounded buds. A little way from the Chalet Alpine Ash or Woolly-butt *E. delegatensis* was plentiful. These trees favour a sub-alpine environment 3000 to 4500 feet altitude which here coincides with the exposure of the Mt. Buffalo granite.

Cliffs at Buffalo. Photo by Zillah Lee.

Birds

Guests were entertained by the colourful Crimson Rosellas *Platycercus elegans* feeding in the Eucalypts or eating food put out on roofs and verandahs. The Pied and Grey Currawongs *Strepera graculina* and *S. versicolon* and Little Ravens *Corvus mellori* also came for food or entertained with their chasing and calling in the tree tops. Black Backed magpies *Gymnorhina hypoleuca*

and Kookaburras *Dacelo gigas* carolled and laughed and Red Wattle birds *Anthochaera carunculata* added their raucous cries. Above Manfield's Lookout Eastern Striated Pardalotes *P. ornatus* were busily feeding high in the Eucalypts and slipping into the hollow branches to feed their entunnelled young.

The Gorge Nature Walk

The gorge nature walk, planned in a circuit from the Chalet gave good views from Bent's, Manfield's and Wilkinson's Lookouts. These lookouts were named for people who made a contribution to the early development of Mt. Buffalo. The Premier Sir Thomas Bent funded the building of the proper road to the plateau in 1908. The Manfield family were among the first to come camping and tramping on the plateau. They built the Temperance Hotel below Eurobin Falls in the 1880s. Dr. J. F. Wilkinson was the first secretary of the Bright Alpine Club who between 1887 and 1897 took an active interest in tourist activities at Mt. Buffalo.

Another early identity is commemorated by a plaque on the Monolith. Edward Carlile, a cattle man of Wandiligong, was the first to climb the Monolith. Taking a rope up with him, he had his wife attach tools and a wire rope ladder. He hauled these up and attached the ladder to the top of the boulder.

Formation of the Gorge

At the gorge Lookout the Nature Guide draws attention to the lattice of cracking over the face of the rock walls. Two such enormous cracks once intersected to encompass a huge wedge of rock. Over millions of years the turbulent waters of Crystal Brook have excavated this massive wedge leaving the cavernous gorge. The precipitous North Wall seen from Pulpit Rock has a sheer drop of 250 m and provides the most challenging climb in the State.

Early History

On this walk the remains can still be seen of the Manfield's Guest House which was burned to the ground in 1928. The proprietress, Lil Manfield was the daughter of John Manfield, one of the first settlers on Mt. Buffalo. Standing on the track looking out at the pattern of Eucalypts, boulders and undergrowth, as early settlers must have done, we marvelled at the courage it would have taken to lead such rigorous and lonely lives.

Further along the track we saw the homes of more ancient settlers the wombats — two large burrows dug beside the track.

Eucalypts

On this Nature Trail the four most common eucalypts were seen. Along the first section to the Crystal Brook bridge the tall, smooth, white or grey-barked Mountain Gum *E. dalrympleana* stands out among the Snow Gums and Buffalo Sallee. It is closely related and very similar to Candlebark Gum *E. rubida* but larger in most features, such as buds and fruits in threes, and having a thicker trunk. It sometimes develops the same reddish tinge on the trunk.

Where the soil is deeper the tall straight Alpine Ash appears. It is a 'half-bark', with thick fibrous bark on the lower trunk peeling to smooth gum bark on the upper half. In the valley on the furthest stretch of the Nature Walk is a pure stand of Alpine Ash, regrowth after the 1939 bushfires, with a few large older specimens which escaped the fire. Alpine Ash is completely killed by fire, but the seed, which needs fire to germinate, soon sprouts in the ash bed, resulting in a forest of seedlings. A natural thinning out process occurs as the stronger specimens outgrow the weaker ones which eventually die out leaving a mature forest.

By the side of the track Grass Trigger Plants *Stylidium graminifolium* were growing. It was interesting to set the trigger off with a twig in imitation of a bee alighting in search of nectar. The trigger sprang up to dust the insect with pollen if the pollen was ripe. Tasman Flax Lily *Dianella tasmanica* growing here had masses of green shining immature berries and the dainty purple Fringe Lily *Thyanotus tuberosus* showed a few delicate flowers.

Bush Birds

In the thicket by the stream the most ubiquitous honeyeater the Yellow-faced *Meliphaga chrysops* was darting in and out. We were alerted by his ringing 'chick up, chick up' and slow whistle of four notes in a

E. Mitchelliana trunk. Photo by E. Costermans.

descending scale. He is an active and inquisitive ashy brown bird tinged with olive and has a bright yellow line below his eyes. These birds gather nectar in Autumn and Spring but in winter they are largely insectiverous and cannot remain on the Mountain.

We were also delighted to watch the fluttering grey Fantails *Rhipidura fuliginosa* as they flitted after insects or to see a placid Grey Thrush *Collunicincla harmonica* with black eye cocked reflectively listening for grubs under the bark. Flame Robins *Petroica phoenicea* were also occasionally seen looking for food or bathing in pools along the track. In thick bush brown Thornbills *Acanthiza pusilla* fed among the leaves while White-browed Scrub-wrens *Sericornis frontalis* hopped under the bushes like little brown mice.

The Trip to the Horn

On Wednesday, 1st February, a bus from the Chalet took us to a spot past the Tatra Inn at the foot of the Horn. On the way the driver stopped at the Leviathan, a great boulder balanced on a very much smaller one. This was a remarkable example of the weathering above and below of so many of the boulders on the plateau. In the morning many of the party walked up the road on to the track and then climbed the boulders and ladders to the great boulder at the top of the Horn. Looking up from the road it was interesting to see how the face of the boulder had been cleaned by the rain washing metal from the railing down over the rock and killing the algae growing there.

A Pool in the Rock

There was a pool of water in a depression in a slab of rock just before the last boulder. In this water we saw Spring-tails, insects with water repellent exoskeletons, the usual six legs and no wings. They were floating in a purplish raft on the surface of the water.

Birds on the Mountain Top

Looking out on the rock surfaces below us we could see half a dozen Pipits *Anthus australis* with bobbing heads and flicking tails, catching insects as they ran over the boulders. Pipits are one of the few birds to remain permanently on the open plains above the snow line. Floating high in the sky above us were several pairs of wedge Tailed Eagles *Aquila audax*. They were soaring with wings upswept and rising on the thermal currents until they were lost to sight.

Along The Track

On the track back to the road there were a few white flowers remaining on the Alpine Westringia *W. senifolia* and the Mountain Gentian *Gentianella diemensis* was out in moist places. The low growing Alpine Grevillea *G. australis* scrambled about the rocks showing white flowers clustered in small heads. Purple Eyebright *Euphrasia collina*, Glacial Eyebright *E. glaciales var. eglandulosa* and Derwent Speedwell *Veronica derwentiana* were also flowering.

As we walked along the road and looked over the tree tops towards Mt. Dunn we heard both Golden Whistlers *Pachycephala pectoralis* and Olive Whistlers *Pachycephala olivacea* calling and the sharp shrill peeping of a flock of Silver Eyes *Zosterops lateralis* as they hurried from tree to tree in search of fruits or insects. Scarlet Robins *Petroica multicolor* were also seen on the Horn track.

A Picnic

When we returned to the picnic spot the manager's wife had a tasty barbecue lunch ready for us. Thinking we were eating country meat, saying how tender it was we were told it came from Melbourne.

The Walk to Dickson's Falls

In the afternoon the bus stopped at the Tatra Inn to allow members to walk across the open snow plain towards Dickson's Falls. Much time was spent crouching amongst clumps and tussocks to look at Green Alpine Leek Orchids *Prasophyllum alpinum* and Mauve Leek Orchids *P. suttonii* flowering in the grass.

There were also fascinating fruits of Alpine Marsh-marigold *Caltha introloba*. They were very decorative and astonishingly robust. Each fruit-head was 2-3 cm across, a multi-pointed star on a sturdy broad stalk that projected some 6-8 cm above nearly heart-shaped leaves. These were spread flat on the ground, but the two extended lobes were turned up where they joined the stalk. Scaly Buttons *Leptorhynchos squamatus* also grew among the grass. Hoary Sunray *Helipterum albicane var. buffaloensis* glowed by the way and Clustered Everlastings *Helichrysum semipapposum* edged the track and Yam Daisies *Microseris scapigera* were in flower.

The track passed through wet heathland where Rosy Heath Myrtle *Baeka ramsissima* still flowered. Alpine Heath Myrtle *B. gunniana* was in full flower and fragrance but the Daisy-bush *Olearia phlogopappa* had finished flowering. Ivy leaf Violet *Viola hederacea* and Prickly Starwort *Stellaria pungens* covered the ground. As the track rose higher through Snow Gum woodland there were many mauve *Brachycome* daisies and Tall Rice Flower *Pimelea ligustrina* and slender rice flower *P. linifolia*, but Mountain Aciphyll *A. simplicifolia* had only its fruits. Pink Alpine Boronia *B. algida* was flowering near Dickson's Falls and also Scaly Phebalium *P. squamulosum*, and the small flower Grevillea *G. parviflora*.

We enjoyed the rest at Dickson's Falls which were named for W. Dickson who was Secretary for Mines when the geology of Mt. Buffalo was surveyed in the early 1900s. Sitting among the boulders we looked down over the Buckland Valley to the blue of the Australian Alps beyond before setting out to walk back to the Chalet. As we reached the road below the Chalet many photos were taken of a beautiful Snow Gum growing out from the rocks at the road side.

Dragons

On all walks a number of lizards were seen sunning themselves on warm boulders or logs beside the tracks. The one member of the dragon lizard family found on Mt. Buffalo — the Mountain Dragon *Amphibolunus diemensis* was seen. It has well developed legs and a long tapering tail. When we disturbed it, it raised its body and ran nimbly away.

Skinks

Two kinds of Skink of the family Lygosominae were plentiful. The Three-lined Skink *L. trilineatum* and the Grass Skink *Leiolopisma guichenoti*. Both look alike with slender polished bronze bodies and a darker line along the centre of the back and on either side. The Three-lined Skink grows to nearly seven inches while the Grass Skink is no longer than four inches.

Bunch of grapes (galls) on tree near chalet. Photo by Zillah Lee.

Both slipped away like a flash into a crevice or under some vegetation for safety.

Of the family Scincinae both rock skinks were seen. The fat black rock skink *Egernia saxatilis* about ten inches long was sunning itself on Mt. Dunn and White's Skink *Egernia whitei* was often seen displaying its striped and spotted body in the sunshine.

Snakes

Two of the three snakes recorded for Mt. Buffalo were seen, the White-lipped Snake *Denisonia coronoides* and the Copperhead *D. superba*. The copperhead was the highland form, dark in colour with a copper coloured head. The small white lipped snake is venomous but not dangerous to man.

Evening Talks

Marie Allender was able to add to the interest and pleasure of our stay by having the Staff TV room (the TV was out of order) reserved for our use in the evenings. Here we enjoyed discussing our days' discoveries, watching Mr. and Mrs. Frank Robins' slides of their recent trip to North America and listening to talks about the area. The first of these talks was given by Dan McInnes on the Geology of the area. This talk added to the interest we took in the magnificence of the gorge views and the boulder-strewn plateau.

Madge Lester gave a well illustrated talk which helped us to identify the three main Eucalypts to be found on the plateau (see *Vic. Nat.*) The next talk, on birds was given by Joan Forster and on the last evening Dr. Elizabeth Turner involved the whole company in recording the insects and animals encountered on our walks.

Rabbits

The most prevalent of the animals were rabbits. Every morning the guests of the chalet were entertained by dozens of rabbits feeding unafraid on the front lawns. It's a pity we could not fully appreciate those bounding little animals with white tufts behind and upright ears in front. We were told that the Ranger has the matter in hand and hopes to have their numbers reduced by this time next year.

The Homeward Journey

On the homeward bus journey down the mountain we were aware of the change in vegetation at 3000 feet to a Peppermint Gum association at the junction of the sedimentary rock and the granite.

From the bus several wombats were seen beside the road and a Lyre-bird *Menura superba* and a Black-tailed or Swamp Wallaby *Wallabia bicolor* crossed the road ahead of the bus. Pelicans *Pelecanus conspicillatus* were seen by a pool, a flock of Sulphur crested Cockatoos *Cacatua galerita* flew over and a number of Little Eagles *Halioetus morphnoides* were floating above.

Our Thanks

We would like to than Marie Allender for her planning and preparation which gave us the opportunity of enjoying the beauty of the High Country and for the chance of finding out more about its natural history.

(My thanks go to the members whose contributions have added their knowledge and experience to this account. Thanks also for help from National Parks Service Publications and the book — Mt. Buffalo National Park by Sue and John Brownlie.

Concerning "Koala, Australia's native bear" of February issue

It is heartening to know that somebody reads one's efforts and is interested enough to write to the Editor, if only in disapproval. I refer to the five corrections provided by Robert Degabriele and published in April issue. I realise that more recent observation and research can disprove what has previously been accepted as true, and hope that other persons with first-hand knowledge will provide further comments on the "facts" (please change that misguided word to "information") collected by this layman.

M. J. LESTER

Note from Dr. K. R. Kerry

I wish to endorse Professor Messer's letter published in the *Victorian Naturalist* Vol. 95, No. 2, page 61.

K. R. KERRY,
Head, Biology Section,
Antarctic Division.

Natural History of Alpine Regions

In December we again plan to publish a special issue of "The Victorian Naturalist". This time we request articles relating to the natural history of the Alpine regions. Material for this special issue should be received by the editor by 30 September 1978.

For Sale

Various bird books and journals and natural history publications by North, Hindwood, Thomson, Pizzey, Cayley, Chisholm, Leach and many others. List available from Harvey Dickison, 26 Rose St., Bentleigh, Vic. 3204.

Field Naturalists Club of Victoria

Reports on FNCV Activities

General Meeting
Monday, 10 April, 1978

The meeting opened with the President congratulating Mrs. Eulalie Bennett on her sixtieth anniversary as an FNCV member.

Speaker for the evening was Dr. Birch on "Victorian Minerals". Minerals are elements or inorganic compounds that occur naturally in the earth's crust. There are about 3000 different kinds of minerals in the world of which Victoria has about 250. Particular minerals are associated with particu-

lar geological environments and the seeker knows what minerals to expect in granite country, in basalt, or in sedimentary areas, etc. Dr. Birch showed colour slides of crystals and crystal clusters from two important granite areas of Victoria — Lake Boga and Cape Woolamai, other minerals from basalt areas, old sedimentary, younger sedimentary, and from greenstones — Victoria's oldest rocks. Many of us had not realised that minerals could be so colourful and varied in form.

Exhibits. From the Otways came a sprig of Privet Mock-olive *Notelaea ligustrina* with globular pink fruits to a centimetre across and small leaves 5 cm x 1 cm. A Chinese Quince, 15 cm long, was rather like a pear in shape but the fatter part was at the stalk end.

A pale green, lozenge-shaped crystal, 3 cm long, was hanging by a fine thread from a tea-tree twig; it was thought to be a spider's egg-sac, but the fleecy interior revealed no eggs. Another 3 cm capsule, but oval and white, contained a small spider.

A fascinating series of photos taken at 10 minute intervals from 12.10am to 4.40am on 25 March showed the eclipse of the moon; an explanatory diagram accompanied the photos.

FNCV Centenary in 1980. Members were asked to unearth any historical material relevant to the Club and Mr. Eric Allan has accepted appointment to the Centenary Committee. There are surely other members who are interested in helping to plan our centenary activities or have ideas of what would be desirable; please contact the President or Mr. Allan. 1980 is only 18 months away!

Annual General Meeting
Monday, 8 May, 1978

Annual Report for 1977 was read by President Mrs. Corrick. The main points were:

Club membership remained at about 750, many new members being offset by members who failed to renew their subscriptions.

The six Study Groups all had an active year but the Field Survey Group continues in recess.

The monthly Sunday outings have continued and there was an 8-day trip to Tasmania in January and a week at Casterton in October. Another Boneseed eradication day was carried out at Studley Park.

With general meetings, Sunday outings, Group meetings and excursions, the $10 membership subscription entitles a person to attend two to three functions of some sort each week!

Council has been handicapped by shortage of members and lack of officers. For almost two years we have had no secretary.

Our Kinglake property has been used as a base for several Group activities. A number of working bees have been held, and there are now two toilets and a barbecue. Some of the Club's larger possessions are now stored at Kinglake.

Our bookstall, under the enthusiastic management of Mr. Dan McInnes, continues to prosper and discounts available to members are much appreciated.

The high cost of publishing The Victorian Naturalist continues to cause concern. The small printing of the Author Index to the Naturalist has been sold out. The Subject Index, compiled by the late Miss Kathleen Hall, is still being prepared for printing and the annual Treasury Grant is being held in reserve to help with its cost.

Another printing of "Ferns of Victoria and Tasmania" was made with the addition of a chapter on cultivation.

The Natural History Medallion was presented to Mr. Jack Wheeler of Geelong.

Treasurer's Report for 1977. Financial pages were printed in April issue 1978.

Treasurer Mr. McInnes reported a surplus of $150 over the year. The cost of publishing the Naturalist has increased by $1300, the total cost being more than $1000 in excess of all subscriptions. But grants from the M. A. Ingram Trust for articles on mammals and birds were $1700 — much larger than previously. Without that assistance the Club would be faced with a heavy loss and it would be necessary to increase subscriptions. The cost of future Natural History Medallions will also be very high — more

than $150 apiece.

Election of Office-bearers and Council Members. The following officers were elected: Editor Mr. Reuben Kent, Librarian Mr. John Martindale, Programmer Dr. Brian Smith, Excursion Secretary Miss Marie Allender, Archives Officer Mr. Barry Callanan, Minute Secretary for general meetings Miss Sue Beattie, and Mr. Frank Koth continues in his appointment as Subscription Secretary/Bookkeeper. There were no nominations for President, Vice-President, Secretary and Treasurer. Council members are M. Allender, P. Genery, M. Howes, M. Lester, G. Love, J. Martindale, B. McGregor, T. Sault, B. Smith, A. Thies, and the Immediate Past President M. Corrick.

Speaker for the evening was the retiring president Mrs. Margaret Corrick on "Looking for Bush-peas". Mrs. Corrick opened with a brief survey of the family Papilionaceae, and with diagrams described the features that distinguish the genus *Pultenaea* from other yellow pea flowers. Pultenaeas occur only in Australia with 120 species of which Victoria has 45. Then followed colour slides of different Pultenaeas in a variety of habitats. Mrs. Corrick concluded by expressing her appreciation of the drawings by Mr. Rex Filson that accompany her *Pultenaea* articles in the Naturalist.

Exhibits were very few, consisting of some Herbarium sheets of Pultenaeas, some tiny white star-fish *Tentorous baculatus*, wing of the Azure Blue butterfly *P. adonis* each under a microscope, and an example of a simple dry mount of a specimen to be examined with a microscope.

Alien languages in the Naturalist. The meeting passed this motion: "Execept for specific names, the Victorian Naturalist shall be printed in English, but up to a quarter of a page in any one issue may be in another language; more than a quarter page of non-English must receive special permission from Council". It was not considered necessary to print the resolution in the Naturalist once a year as the combined memory of Council members would recall it if the occasion arose.

"White Fly" Pupa Cases

Mr. F. Morley states that it is the pupae not the larvae that had been parasitized by a wasp.

60 years Active Membership

Mrs. Eulalie Bennett is a regular attendant at Club meetings and often contributes to those meetings with natural history exhibits or nature notes. April marked her sixtieth year as an FNCV member. At the general meeting on 10 April, volumes of 1918 "Naturalist" were displayed along with the usual collection of natural history exhibits. Looking at those 1918 Naturalists makes one realise what a wealth of changes, of association with former notable members, of controversies, and interesting memories are acquired during 60 years.

All members will join with the President in congratulating Eulalie Bennett on her 60 years active membership and in wishing her a healthy lot more.

New FNCV Reporter

Over some years Miss Madge Lester has been reporting FNCV activities for these pages and her contributions have been much appreciated. But in June, Miss Sue Beattie will become Club Reporter and all will wish her satisfaction in her new undertaking. Study Groups and individual members can help our Reporter by supplying information that they think will interest other Club members. Simply post to Miss S. Beattie at P.O. Box 137, Heidelberg, 3084 or phone 459 2900 Ext. 117.

If you want your material to be in a particular issue, it must be with our Reporter *before the 7th of the preceding month.*

But the same Club Diaryist as formerly

Material for the FNCV Diary pages should continue to be sent to Miss M. Lester, 4/210 Domain Road, South Yarra, 3141, *before the 14th of the preceding month*. If programmes are not received in time, only the dates of Group meetings can be included.

ED

(Continued from page 86)

GROUP MEETINGS

All FNCV members are invited to attend any Group Meeting, no extra payment.

At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month — Geology Group

Wednesday, 7 June. "Limestone caves of Victoria". Mr Lloyd Mills (Speleology Association).
Wednesday, 5 July. "Aboriginal culture of Australia". Dr Gallus.
Wednesday, 2 August. "Space Exploration, What? for Geology". Mr G. Love.

Third Wednesday in the Month — Microscopy Group

Wednesday, 21 June. How to prepare and mount objects in Canada balsam, glycerine jelly, Euparal and other mountants. ¼-hour members' exhibits.
Wednesday, 19 July. Pond and Marine Microscopic Life. Collection, Treatment, Method of Viewing and Preservation. ¼-hour members' exhibits.
Wednesday, 16 August. Zoological and Botanical Section cutting, staining and mounting. ¼-hour members' exhibits.

Second Thursday in the Month — Botany Group

Each meeting includes a ¼-hour session for beginners — various subjects.
Thursday, 13 July. "Key Night". Plants and Ferns will be keyed out using overhead projector.
Thursday, 10 August. "Plants and their Habitats". Mornington Peninsula. Mr Tom Sault.

At the Conference Room, National Museum, at 8.00 p.m.

Good parking area — enter from Latrobe Street

First Monday in the Month — Entomology and Marine Biology Group

Monday, 3 July. "Dragonflies and damsel flies". Mr Urwin Bates.
Monday, 7 August. "Insects and the Camera". Mrs Z. Lee.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.

First Thursday in the Month — Mammal Survey Group

Thursday, 6 July, 3 August, 7 September.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions.

GEOLOGY GROUP

Sunday, 25 June. "Geology of the South Morang Area".
Meet at 10.00 a.m. South Morang Hotel, South Morang.

BOTANY GROUP

Saturday, 24 June. "Mosses", Mt Macedon.
Saturday, 22 July. "Ferns", Warburton.
Saturday, 26 August. "Habitat", Mornington Peninsula. Leader Mr Tom Sault.

DAY GROUP — THIRD THURSDAY IN THE MONTH

Thursday, 15 June: Weather Bureau. Meet at Carlton Gardens, near corner of Latrobe and Spring Streets at 11.30 a.m. for lunch, after which we cross to the Commonwealth Centre to meet our Guide at 1.25 p.m. Once again the number is limited, so please contact the Group Secretary before the due date.
Thursday, 20 July: National Gallery. Meet at Batman Avenue corner, 11.30 a.m.
Thursday, 17 August: Botanical Gardens — Lakes area. Meet at corner Park Street and Domain Road, 11.30 a.m.

Weekend Camps of Mammal Survey Group

10-12 June. Gelliondale (near Yarram)
Details of later camps to be arranged. Contact Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron:
His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Honorary Office-Bearers 1977-1978

President:
Dr. BRIAN SMITH, 8 Huntsford Avenue, North Clayton, 3168 (560 8358)

Vice-President: Mr. DAVID M. LEE, 15 Springvale Road, Springvale, 3171.

Secretary: Mr. G. JOHNSON, 20 Sydare Avenue, Chadstone, 3148 (56 3227).

Correspondence to: FNCV, National Herbarium, The Domain, South Yarra, 3141.

Treasurer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern, 3145 (211 2427).

Subscription-secretary: Mr. F. J. KOTH, 21 Smart Street, Hawthorn, 3122.

Editor: Mr. R. D. KENT, 16 Papua Street, Watsonia, 3087. (435 8664.)

Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3161. (527 2749.)

Sales Officer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern, 3145. (211 2427.)

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

Botany: Mr. CAMERON McCONCHIE, 158 Warrandyte Road, Ringwood, 3134 (870 9986).

Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127. (89 2850.)

Field Survey: Mr. R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126 (836 8009.)

Geology: Mr. T. SAULT, c/o National Herbarium, South Yarra, 3141.

Mammal Survey: Mr. MICHAEL HOWES, 10 Palmer Street, Fitzroy, 3065.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1977

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Members, Subscribers and Retired Persons	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$1.20

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary

JENKIN BUXTON PRINTERS PTY. LTD., WEST MELBOURNE

the
victorian naturalist

Vol. 95, No. 4 July/August, 1978

F.N.C.V.

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
in which is incorporated the Microscopical Society of Victoria

$1·20

Registered for posting at a periodical – category "B"

FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra

Monday, 14 August, 8.00 p.m.
Speaker: Dr P. J. Keame, Lecturer in Bontany, LaTrobe University
Subject: Fungi in the environment

Monday, 11 September, 8.00 p.m.
Speaker: Mr Ken Simpson, Lecturer, Science Department, Burwood State College.
Subject: Natural History writing.

Monday, 9 October, 8.00 p.m.
Speaker: Dr T. Rich, Curator of Vertebrate Fossils, National.
Subject: Some Australian vertebrate fossils.

Monday, 13 November, 8.00 p.m.
Speaker: Probably winner of 1978 Natural History Medallion.

New Members — August General Meeting

Ordinary:
Mr C. Murdoch, 26 Greta Street, Greensborough, 3088.
Mr D. Palmer, 82 Kera Street, Frankston, 3199. Botany Entomology.
Mr P. Mathews, 31A Howard Street, Glen Iris, 3136. Botany, Mammals.
Mr M. Schulz, 37 Halifax Street, Glen Iris, 3146. Mammals.
Mr P. Dawson, 16 Aintree Road, Glen Iris, 3146. Botany.
Mr G. Flint, 15 Ratten Avenue, North Kew, 3102. Field Survey & Ecology.
Mr G Morgan, 14 Wentworth Avenue, Sandringham, 3191. Botany, Geology, Mammal survey
Mr S. Derrick, 208 Barkly Street, East Brunswick, 3057. Botany, Entomology.
Mr D. Philipstos, 1/19 McIlwraith Street, North Carlton, 3054. Mammals.
P. Boocks, 47 Walpole Street, Kew, 3101.

Joint Members:
Mr A. Broughton & Ms J. Windle, 59 Martin Street, Thornbury, 3071. Plants, Birds.
Mr K Rissanen and Mr J Rissanen, 24 Buckmaster Drive, Mill Park, 3082 Geology, Botany.
Mr N. G. Campbell & Mrs A. Campbell, 6 Lowan Avenue, MacLeod, 3185. Botany.
Dr & Mrs M. W. Johns, 187 Rathmines Road, Hawthorn, 3123.
Mr N. Wallace and Mrs P. Wallace, 23 Ormond Road, Ivanhoe, 3079.

Country Members:
Mr F. E. Bienvenu, P.O. Box 235, Myrtleford, 3737. Plants.
Mr C. Cornwall, 47 Federation Avenue, Horsham, 3400. Mammals.
Mr B. G. Hotton, 98 Lascelles Street, Hopetoun, 3396. Geology.
Mr R. Ford, P.O. Box 137, Sunbury, 3429. Entomology.

FNCV EXCURSIONS

Sunday, 20 August. Cranbourne Botanic Gardens Annex. Coach will leave Batman Avenue at 9.30 a.m. Fare $5.00. Bring one meal.

Sunday, 17 September. Brisbane Ranges. Coach will leave Batman Avenue at 9.30 a.m. Fare $5.00. Bring one meal and a snack.

Saturday, 14 October — Friday, 20 October. Grampians and Little Desert. Coach will leave Melbourne on Saturday morning for Ararat probably via Mt Cole; two nights at Ararat, one at Horsham, three nights in Little Desert Lodge at Nhill. Accommodation will be booked on dinner, bed and breakfast basis. Cost, including coach, approx. $180. Deposit $25 should be paid when booking, balance by 12 September. Bookings with Excursion Secretary.

Preliminary Notices. Cup Day, Tuesday, 7 November. President's picnic to Bushranger's Bay. Juniors are especially invited to attend.

Saturday, 30 December — Saturday, 6 January. Bundanoon, NSW. Details in next Naturalist.

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Cover Illustration: *Litoria brevipalmata* (Q.M.J32056) Jimna area, South-East Queensland.
(Photo courtesy A. Easton, Queensland Museum.)

Observations on the Biology of the Dwarf Galaxiid, *Galaxiella pusilla* (Mack) (Pisces: Galaxiidae)

BY G. N. BACKHOUSE* AND R. W. VANNER**

Introduction

Fishes of the family Galaxiidae are confined mainly to the southern hemisphere, with species occurring in South Africa, South America and the Falkland Islands, New Zealand and outlying islands, New Caledonia, Lord Howe Island, mainland Australia and Tasmania (Frankenberg 1969).

Six species of galaxiids, belonging to two genera, are found in Victorian waters: *Galaxias brevipinnis*, *G. maculatus*, *G. olidus*, *G. rostratus*, *G. truttaceus*, and *Galaxiella pusilla* (R. M. McDowall, New Zealand Fisheries Research Division, pers. comm.).

The dwarf galaxiid has previously been placed in the genera *Galaxias* (Mack 1936; Andrews 1976) and *Brachygalaxias* (Scott 1942; Munro 1956; Frankenberg 1969; Lake 1971).

However, McDowall (1973) questioned the inclusion of *Galaxias pusillus* in the genus *Brachygalaxias* and proposed the genus *Galaxiella* (McDowall 1978) to include the dwarf galaxiid and two similar Western Australian species, *Galaxiella nigrostriata* and *Galaxiella munda*.

The biology of the dwarf galaxiid is poorly understood. Massola (1938) reported the spawning of the dwarf galaxiid in an aquarium and Frankenberg (1974) included brief information on its habitat. The present study was undertaken to increase the available knowledge concerning the biology of the dwarf galaxiid.

This paper presents information gained from preliminary observation of the dwarf galaxiid, *Galaxiella pusilla*, both in field and in laboratory aquaria.

*Victorian Fisheries and Wildlife Division, Snobs Creek Freshwater Fisheries Research Station and Hatchery, Private Bag 20, Alexandra, Vic., 3714.

**Eastern Districts Aquarium Society Native Fishes Study Group, C/o Hon. Secretary, Mr. G. Brockhoff, 24 Harlington Street, Clayton, Vic.

Materials and Methods

Field observations were made from mid-April until early September (1977) at Cardinia Creek, Berwick, Diamond Creek, Tonimbuk, and Narracan Creek, Moe.

Aquarium observations were made from about 20 specimens, collected from Narracan Creek, Moe, in mid-April and placed in a 20 l aquarium, and from about 50 specimens collected from Diamond Creek and Narracan Creek in early and late August, and placed in 80 l aquaria.

The aquaria had a gravel substrate and were thickly planted with aquatic vegetation. Filtration was supplied by sub-sand filter systems.

Specimens were collected using fine mesh dip nets. All measurements (except where otherwise stated) were taken from material preserved in 10% formalin.

Description of Adult Fish

The dwarf galaxiid is the only galaxiid known to exhibit sexual dimorphism. No information is available yet as to whether the related Western Australian galaxiids exhibit this phenomenon.

Males are smaller and more brightly coloured than females. Total lengths of a sample of 21 mature males ranged from 29.8-33.5 mm, and maximum body depth from 4.0-4.5 mm.

Total lengths of a sample of 16 mature females ranged from 32.5-40.3 mm, and a maximum body depth from 6.3-6.9 mm.

The dorsal surface of the male is light brown, and often has a few scattered small black dots. Laterally, two black horizontal lines run along the body of the fish, the

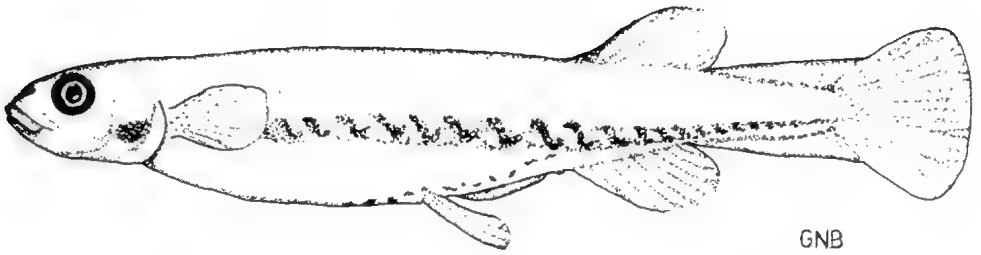

Fig. 1. *Galaxiella pusilla*. female. 36.5 mm. T.L. Cardinia Creek, Beaconsfield.

uppermost line starting above the eye and running through to the caudal peduncle, while the lower line starts from the mid-operculum and runs through to the anal fin, then ventrally to the caudal peduncle.

Between these two black lines is a bright orange-red stripe. The ventral surface is white, often with two rows of small black spots extending back from the jugular region to the ventral fins.

The dorsal and upper lateral surfaces of the female are light brown, and a black line runs mid-laterally from the operculum to the caudal peduncle. Often a purplish-green iridescent line is present just above the black line. The ventral surface is white.

Distribution

The dwarf galaxiid is widespread throughout Victoria (Fig. 2), probably more so, especially in the Gippsland region, than previous reports (Andrews 1976; Frankenberg 1969; Munro 1956) indicate.

The species is also found in far eastern South Australia (C. J. M. Glover, South Australian Museum; pers. comm.), Flinders Island, and the Waterhouse district of north-eastern Tasmania (Frankenberg 1974).

Fig. 2. Distribution of *Galaxiella pusilla* in Victoria.

Description of Habitat

The dwarf galaxiid is typically found in still waters such as swamps, drains and backwaters of creeks and streams. The waters are usually shallow, often less than 30 cm deep and have abundant aquatic vegetation. In larger pools the galaxiid is usually captured in the marginal vegetation surrounding the edge of the pool.

The waters inhabited by the galaxiid are often temporary, drying up partially or completely during summer, and being replenished by rainfall or floodwaters from a watercourse during the wetter months.

Non-breeding Behaviour

Little is known of the habits of this diminutive fish in the wild. Adult fish were not observed during the day, although the dense surface vegetation typical of their habitat precludes observation below the surface. However, juvenile fish were readily observed on the surface in vegetation-free areas of the pools. They often congregated in groups of as many as 20 individuals but schooling behaviour* was not evident.

The dwarf galaxiids survived satisfactorily in aquaria, especially if these were densely planted with aquatic plants. The fish were active during the day, occupying most levels of the aquarium, but apparently preferred the lower strata and rarely approached the surface. Schooling was not observed, and intraspecific aggression ap-

*Fish moving as a co-ordinated group.

peared minimal, if not absent. When frightened by some external stimulus, such as sudden movement or bright light, the fish immediately darted to the bottom of the aquarium and hid amongst the plants.

The diet of the dwarf galaxiid is not known, but in aquaria they fed on plant material, such as filamentous algae, and accepted insect larvae and other freshwater invertebrates. They also accepted commercially-prepared fish food.

Breeding Biology

Little is known of the breeding biology of the dwarf galaxiid in its natural habitat. Gravid females and larval fish were observed in the study areas from late July to early September.

A sample of 26 larval fish taken from Diamond Creek in late August measured 5.1-19.3 mm.

Dwarf galaxiids taken from Narracan Creek in early April and placed in an aquarium spawned eight days later. When captured the females did not appear to be gravid, but ripened rapidly when introduced to the aquarium. Females captured from the same location in early and late August were obviously gravid and spawned within 48 h of introduction into an aquarium. The first indication of spawning was given when a male gently nudged the jugular and abdominal regions of a female. Often two, and sometimes three males were observed displaying this behaviour towards a single female.

The intensity of the red stripe did not vary during this prespawning activity, and there was no elaborate display pattern.

At this stage if the female was not ready to spawn, she rapidly swam away from the courting male(s); if ready to spawn, she allowed the attentions of the courting male(s) to continue.

Then the female and one male entered dense vegetation and investigated numerous sites on the leaves and stones on which to deposit the eggs. When a site had been selected, the pair brushed their bodies rapidly forward over the leaf or stone.

Two movements facilitating egg deposition were observed. The female made a rapid pass and, pressing the genital aperture momentarily to the selected site, deposited a single egg on the top surface of stones or leaves. On narrow-leaf plants the egg may be sheared off as the female passed, adhering to the lower surface. However, the preferred site for depositing eggs appeared to be the lower surface of a leaf. The egg is deposited by the female moving forward under the leaf, rolling over quickly and depositing the egg. The male fish then moved past the egg one or more times, but precise moment of fertilisation is not known.

The prespawning behaviour often lasted several minutes although spawning occurred in a few seconds. After the egg had been laid the pair separated and paid no further attention to the egg. Pair bonds were of a brief duration — males spawned with any female that was ready, and after spawning searched out other females ready to spawn. Females spawned several times in a single day.

At temperatures of 16-21C and a pH of 6.9 the eggs hatched in 10-14 days. The "eyed-stage" was visible after 5-6 days. After emerging tail-first, the larvae fell to the bottom of the aquarium. A sample size of 6 larvae measured 4.2-4.8 mm long. A prominent yolk-sac was visible. Within 1-2 days the young fish swam to the surface and remained just below the water surface. The yolk-sac was fully absorbed within 3 days, and the larval fish swam freely near the water surface.

No more than 18 eggs were laid in any 24 h period, and at least two females contributed to this number.

Examination of the ovaries of 12 mature females in breeding condition from the three study areas revealed 155-197 eggs per female. These fish were obtained in late August, after the spawning season had been in progress for at least one month. The diameter of a sample size of 15 unfertilized mature eggs ranged from 0.7-0.8 mm, while the diameter of 12 fertilised, unpreserved eggs ranged from 1.1-1.3 mm.

Discussion

Little is known about the breeding biology of galaxiids although that of *Galaxias maculatus* ((McDowall 1968; Pollard 1971) and *G. vulgaris* (Cadwallader 1976) has been studied. Comparison of the reproductive modes of the three species reveals an interesting difference in breeding biology.

Galaxias maculatus lives in freshwater, but migrates downstream during the breeding season to spawn on the grassy banks of estuaries covered by the peak of a spring tide. The eggs develop, out of water, until the next peak tide, about two weeks later, covers the eggs, which then hatch. The larvae are washed out to sea, where they develop. After several months the immature fish migrate into fresh water. As many as 13 000 eggs are laid (McDowall 1968) apparently on the estuarine grasses, as no nest is made.

G. vulgaris (a New Zealand species) is confined to freshwater, and lays fewer eggs than *G. maculatus*.

Cadwallader (1976) recorded 284-1911 eggs per female. *G. vulgaris* also constructs a nest, a depression in the gravel beneath overhanging rocks, into which several females may spawn.

The construction of a nest, a more precise breeding behaviour, increases the chances of fertilization of the eggs, and with this increase in fertilization success there is a decrease in fecundity.

Our observations of the spawning habits of the dwarf galaxiid, and the numbers of eggs appearing in the aquarium each day suggest that each female lays only a few eggs a day, probably no more than 10. Therefore each female probably spawns over an extended period, possibly two weeks or more. Massola (1938) observed that a female dwarf galaxiid laid 59 eggs in two days, then died.

The most precise method of fertilization and consequently that providing the highest chance of an egg being fertilized is the laying of a single egg in a predetermined spot. Thus the dwarf galaxiid shows the most refined reproductive behaviour so far known among the Australian galaxiids.

The small South American species *Brachygalaxias bullocki* spawns in a similar fashion (Campos 1972), but has a lower fecundity (50-120 eggs; average 100) and slightly larger eggs (1.0-1.9 mm) than the dwarf galaxiid. About 7 eggs are laid in a 24 h period.

B. bullocki may show a slightly greater refinement than the dwarf galaxiid in that the pair bonds last for several hours, which, even though temporary, are considerably longer than those of the dwarf galaxiid.

The habitat of the dwarf galaxiid poses an interesting question. How do populations of the species survive when their habitat, usually shallow, still waters, dry up partially or completely during summer. In such hostile environments fish have developed several methods of surviving, but which one the dwarf galaxiid employs is not known.

Some galaxiids are capable of aestivation, usually burying themselves beneath rocks or logs as the water recedes. This has been demonstrated in two of the New Zealand *Neochanna* sp. (McDowall 1970) and may occur in some of the Tasmanian galaxiids (Frankenberg 1974).

If the dwarf galaxiid dies out from hostile areas as the water dries up, it may be able to recolonize such areas rapidly when sufficient water is available.

What we already know of the dwarf galaxiid's lifestyle shows that its survival depends on suitable habitats such as shallow, still waters.

Where rivers are channelized and water courses are encased in concrete, there is less prospect of the creation of suitable habitats such as would occur during flooding. The draining of swamps where the dwarf galaxiid lives is also detrimental to its survival.

It is hoped that future studies may help answer some of the many questions posed by the life history of the dwarf galaxiid, which is certainly unique among the galaxiids of Victoria.

Acknowledgements

The authors would like to thank Dr. P.

Jackson and Dr. D. Evans for commenting on the manuscript and Miss S. Beattie for preparing the distribution map.

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Australian Natural History Medallion Fund

Amount on hand invested — 20 April, 1978		$656.00
Latrobe Valley Field Naturalists Club		10.00
Newcastle Flora & Fauna Protection Society (second donation)		10.00
Portland Field Naturalists' Club		10.00
The Entomological Society of Aust. (N.S.W.)		25.00
Mrs. N. A. Wakefield (third donation)		10.00
Illawarra Natural History Society (third donation)		10.00
	Total	$731.00

Inflation and the Medallion — A note to donors

We extend our thanks to all who have so far subscribed to this fund. In 1975 the quote for making the Medallion was $83 plus 15% sales tax, a total of $95.45. This year, 1978, the quote without sales tax was $220. Because of the prestige of the award the manufacturer is generously offering to make it for $150, i.e., $172.50 after adding sales tax. This large rise in the cost of the actual Medallion, coupled with increasing postal charges, will almost double the total cost of administering the award.

Without the assistance of the income from this fund the future of the Medallion would have been very uncertain. The fund will remain open and further donations would be appreciated.

MARGARET CORRICK,
Secretary to the Australian Natural History
Medallion General Committee.

Recent Foraminifera from Limeburners Bay, Victoria

BY K. N. BELL*

Abstract

Twelve species of foraminifera have been recorded alive from tidal mud flats at Limeburners Bay, Victoria. The estuary can be divided into two regions, a southerly zone with *Ammobaculites exiguus* and a northerly zone with *Miliammina fusca* as the characteristic species.

Locality

Limeburners Bay is an inlet on the north side of Corio Bay which is on the western side of Port Phillip Bay. Into the inlet flows Hovell's Creek which is also known as Duckponds Creek and as Limeburners Creek. Whilst flowing throughout the year, the creek has a restricted flow during the summer months.

The estuary is protected from any excessively strong wave energy as it is located behind a sand spit which almost completely closes the entrance. This type of estuary may be called an estuarine lagoon.

Tidal influences extend up to the Princes Highway Road bridge.

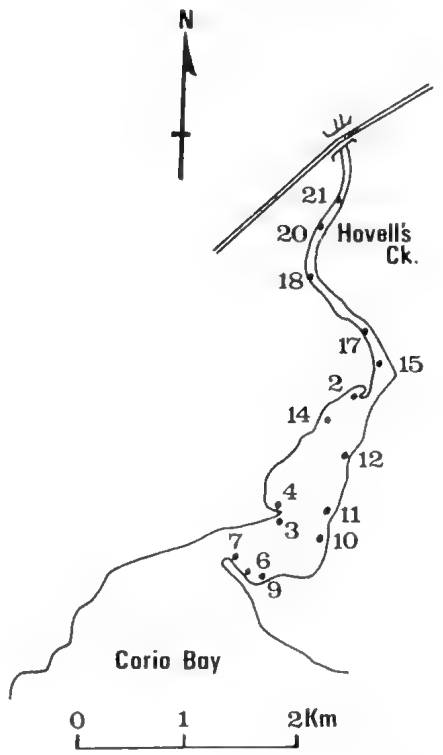
Methods of Study

Because of the shallow nature of the inlet (3 metres deepest), at low tide large expanses of flats are exposed. All the samples investigated were collected from these flats at low tide during July, 1969. No special collecting device was used. Approximately 50 g of wet sediment was taken from the top 1-2 cm and placed in 70% alcohol. After washing out the sea-water and preservative with fresh water, a small amount of 0.1% rose Bengal stain solution was added and the sample allowed to stand for 2 hours. The sample was then dried and the foraminifera floated off using carbon tetrachloride. Organisms which were living when collected had the protoplasm stained bright red. It was found that many dead tests stained pale pink but were easily distinguished from the living foraminifera.

Sample localities are shown on Fig. 1. The samples consisted of 5 types:

(a) shell debris with sand but very little clay or organic matter — samples 6, 7;

(b) a thin layer of sand (½-1 cm) overlying black, broken shells — samples 3, 4, 9, 10, 11, 14, 15;



*Honorary Associate, Invertebrate Department, National Museum of Victoria.

DISTRIBUTION OF FORAMINIFERA AT LIMEBURNERS BAY

SAMPLES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Miliammina fusca	C													F	F	C	C	R		C	
Trochammina inflata															R		R			R	
Ammobaculites exiguus						C	C	C	R												
Ammotium australiensis								R													
Elphidium barwonensis								R													
Quinqueloculina seminula	R	R	F	C	R	F	C			F				R	C			R	
Q. poeyana						R	R			R											
Ammonia aoteanus	C	R	R	R		C	C	C	C	C	F	R	F	R		R		B	
Bulimina elegantissima						R		R													
Elphidium craticulatum						R	R														
E. advenum	R		F	C		C	C			R	F		R								
E. simplex	R						R				R										
Number of Species/Sample	5	2	3	3	2	7	9	3	5	5	3	5	2	4							

(c) a thick layer of sand (3-5 cm) overlying black, broken shells — sample 2;
(d) a thin veneer of sand (½-1 cm) overlying basalt blocks — sample 12;
(e) a thick clayey mud — samples 17, 18, 20, 21.

Upstream from sample 15 mangroves line the west bank of the creek for about 0.5 km. Samples 20 and 17 came from the mangrove flats and sample 18 from a "*Zostera*" bed lying between two mangrove flats.

Abundances of species is indicated by R (rare), F (frequent) and C (common). Samples 1, 3, 5, 8, 13, 16, 19 contained no live forams.

Fauna

The table shows the species found alive at each locality. Of the 12 species found alive only 5 are of frequent occurrence — *Ammonia aoteanus, Miliammina fusca, Ammobaculites exiguus, Quinqueloculina seminula* and *Elphidium advenum*. These figures show that the estuary can be divided into two zones — one characterized by *M. fusca* in the upper reaches, the other zone characterized by *A. exiguus* and being restricted to the lower reaches of the estuary. The other three main species have a widespread distribution. All other living species found are very rare being represented by only 1-4 specimens and these occurring in few samples.

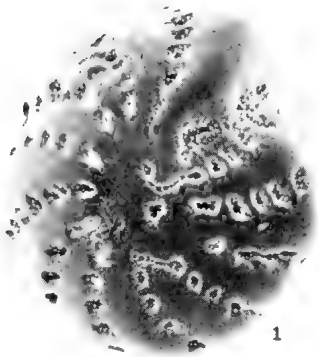
List of Species

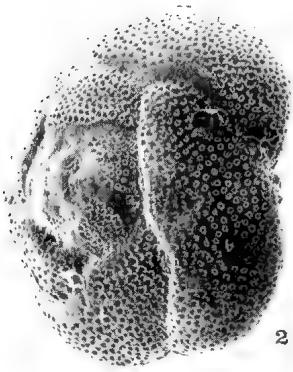
Ammonia aoteanus (Finlay); 159 specimens. This is the most common species over the entire tidal flat. There is no indication of heavy beading on the sutures or the base as is characteristic of *A. beccarii*. The staining of the tests showed that the protoplasm occurred in the penultimate chamber. The remainder of the test chambers was pale green.

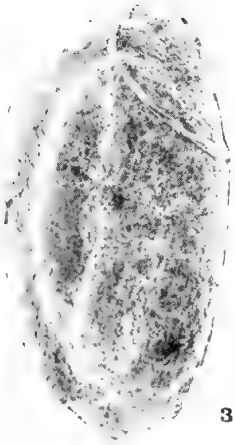
Ammotium australiensis (Collins); 2 specimens. Both specimens were small and ill-formed.

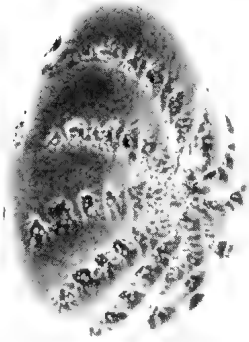
Miliammina fusca (Brady); 76 specimens. Typical, well formed specimens were common but restricted to the upper reaches of the estuary. The protoplasm was always found to be contracted within the test chamber and never extruded.

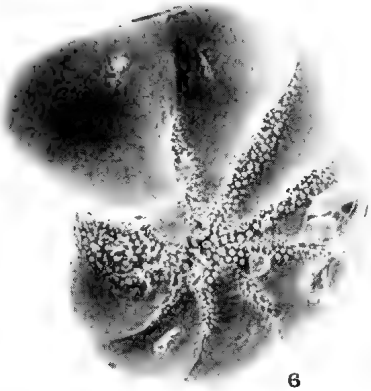
Ammobaculites exiguus (Cushman and Bronnimann); 48 specimens. All living specimens came from the east side of the











1. *Elphidium craticulatum* X125. 2 *Discorbis dimidiatus* X70. 3 *Miliammina fusca* X70. 4. *Ammobaculites exiguus* X35. 5. *Elphidium advenum* X125. 6. *Elphidium simplex* X100. 7. *Ammonia aoteanus* X125.

lower part of the estuary. The planispiral coil section of the test has been found detached from the uniserial linear segment. The test is coarsely arenaceous being made of agglutinated platy sand grains.

Trochammina inflata (Montagu); 5 specimens. Although rare alive, dead specimens were present in large numbers (especially in sample 2).

Reophax barwonensis (Collins); 3 specimens.

Quinqueloculina seminula (Linne); 62 specimens. This is a characteristic species of most Victorian intertidal mud flats. The protoplasm was found extruded from the aperture as a rounded tongue in most cases.

Quinqueloculina poeyana (d'Orb); 8 specimens. This species is easily distinguished by its costate sculpture. The protoplasm was found extruded from the aperture and attached to sand grains.

Buliminella elegantissima (d'Orb); 2 specimens. This species is more characteristic of fully marine environments. No dead tests were found. The specimens were quite small.

Elphidium advenum (Cushman); 59 specimens. A widespread species, although the number of specimens present in each sample varied greatly. The penultimate chamber stained red, whilst in many cases the remainder of the test was green.

Elphidium craticulatum (Fichtel and Moll); 2 specimens.

Elphidium simplex (cushman); 3 specimens. One specimen was found in each of 3 samples (2, 11, 15) from the middle reaches of the estuary. Specimens were small and not as lobate in outline as specimens from other intertidal localities.

Discussion

Overall, the living fauna is typical of intertidal mud-flats from other Victorian localities although many of the specimens were much smaller than the normal size. This may be due to the influence of the freshwater from Limeburners Creek and the resulting wider salinity ranges occurring in the estuary compared with the normal mudflat environment.

The presence of the rare species in the mid-estuary area and not near the entrance where the water is of normal salinity is due to the effects of the substrate. Near the sand spit entrance the substrate consists of mobile sands with little clay or weed to form a firm support for the forams. At site 10 and upstream the substrate becomes more clayey thus forming a suitable environment. The deepest water is near sites 10 and 11 and these are less affected by the freshwater run-off, so forming a typical tidal mud flat area in these middle reaches of the estuary.

Acknowledgement

The R.M.I.T. Electron Microscope Unit, Dept. of Applied Physics, took the photomicrographs of the seven species of foraminifera shown on the plate.

Victoria's Oldest Flowers

BY J. G. DOUGLAS*

Resume

Two flower compressions recently collected from Victorian Lower Tertiary sediments are among the oldest recorded from Australia. One from Anglesea is tentatively placed in the Myrtaceae, the other from near Mount Hotham has floral parts less clearly distinguishable, making relationship to present day genera more conjectural.

Introduction

Most plant vegetative and reproductive organs are fossilized in profusion in favourable locations. In extreme abundance they form coal, but are so changed that the components are difficult to isolate and recognize. Often, in mudstones, leaves and stems are readily recognizable as impressions, or compressions with epidermal structures preserved. In fine grained sandstone heavier woody material may be silicified or otherwise preserved, and pollens, spores, and other fertile organs occur in a variety of sediments. Carbonaceous fruit remains, sometimes quite sizeable, were commonly found in our sub-basaltic deep leads or hidden streams during the early gold mining days.

An exception is the flower, or specialized reproductive shoot of the angiosperms, which is rare or absent in most fossil assemblages. The record for Australia is meagre, but has been supplemented by the recent discovery of specimens from two Victorian localities.

In November, 1976, a visit to the ALCOA† brown coal open cut at Anglesea (Fig. 1) was organised by the Geological Survey of Victoria for a small party of local and overseas scientists. Plants in varying stages of preservation were found en masse in a mudstone lens exposed in the overburden, and on a subsequent visit in February, 1977, a flower compression was collected.

Fig. 1. Locality map.

In March, 1977, plant fossils were collected from black shales very near the top of sub-basaltic Tertiary fluviatile beds at the abandoned Brandy Creek mine, near Mount Hotham. The assemblage, sparse compared with that of Anglesea, also yielded a well preserved compression of a small flower.

Geology

A summary of the geology of the Eastern View Coal Measures was included in Gloe (1976). The plant bed under discussion is interbedded in sand and gravel 30 m below the surface, and appears to be conformable with the upper coal seam. Stratigraphical relationships suggest that the lens is in the Upper Eocene part of the section. Associated plant fossils are mostly broad leaved dicotyledons, but ferns and conifers were figured in an introductory report (Douglas 1977).

At the Brandy Creek mine, sluicing for gold has exposed a section where basalt overlies Tertiary sediments, which in turn

*The author is grateful to ALCOA of Australia Limited for facilitating access to the open cut area during several visits.

† Geological Survey of Victoria.

overlie Ordovician bedrock. Underlying the basalt is a weathered yellow-brown clay, in turn underlain by a lignite band up to 20 cm in thickness. The flower was found in a fine black shale below this lignite. A moderately fine grained gravel, the source of most of the gold obtained, underlies this shale and forms the greater part of the Tertiary sequence. The co-fossilized plants are mostly angiosperm leaves, smaller than the majority of those in the Anglesea assemblage. Ferns and conifers are also present.

Description of Specimens

Registered numbers: GSV 65088, 65089 (Counterpart). Locality: Anglesea, ALCOA brown coal mine. Northwest corner of open cut excavation, in eroded corner of overburden wall. See ALCOA Quarterly Survey, March, 1977, drawing number 1-006230-AA, Scale 1:1250. Collectors: J. G. Douglas & R. Gould. Date: 8/2/77.

Identification: Cf. *Leptospermum* sp. (Figs. 3a, 3b.)

Description: Compression, with compression-impression counterpart. Receptacle, circular, diameter. 1 cm, with 5 semi-hemispherical appendages (sepals?), radius approximately 5 mm, joined at, or very near, receptacle periphery.

Remarks

All the evidence indicates that the fossil is a dicotyledonous flower with a large receptacle and 5 appendages. There are numerous families with members bearing floral parts in similar array, and among the most closely comparable is the Myrtaceae.

Observations on several members of this family showed that they lose petals much more readily than sepals when perianth wilting proceeds. This was particularly evident in *Leptospermum* species where thin sepals persist after the petals have fallen, and the appendages of the fossil are therefore regarded as sepals.

Because, in addition, cuticle from the macerated fossil appendage is very closely similar to that of the extant *Leptospermum* sepal, an affiliation with *Leptospermum* is suggested.

Registered number: GSV 65090.

Locality: Brandy Creek mine, 3 km north east of Mount Hotham. Coords. Alpine area, 1:10,000, 645321. Under basalt cliff in southern exposure.

Collector: J. G. Douglas.

Date: 23/3/77.

Identification: Dicotyledonous flower. (figs. 2a, 2b.)

Description: Black carbonaceous compression, diameter 12 mm, with 10? prominent oblong-lanceolate appendages, maximum length 10 mm. Appendage width up to 5 mm, apex rounded, with numerous fine longitudinal surface striae, joined by transverse members forming delicate rectangular pattern visible under low magnification. Stalk length preserved 2 cm, width 2 mm at receptacle base.

Leaf associated, apparently lanceolate, lamina length 2 cm, width greater than 1 cm, margins obscured. Midrib prominent, secondary veins at 70°, fine tertiary vein system interconnecting.

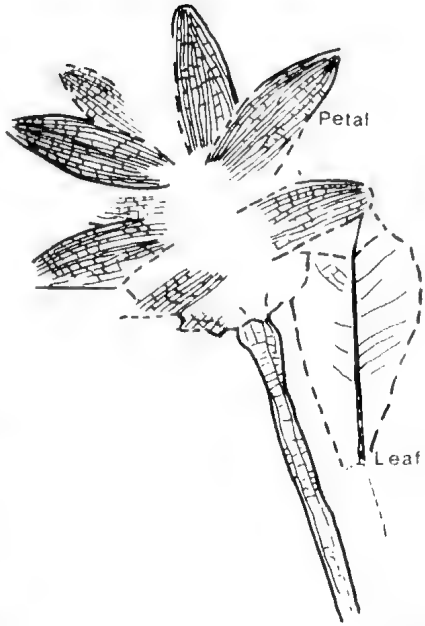
Remarks

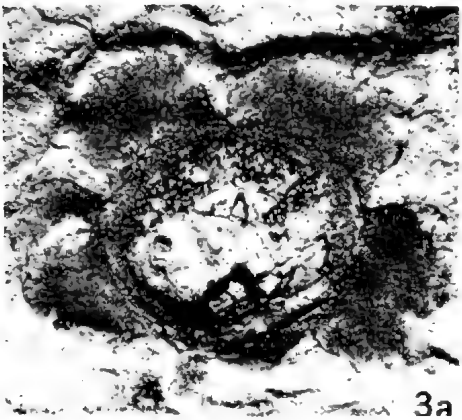
Preservation and attitude of fossilization is such that much of the fossil is obscured. Distinction of parts among the mass of compressed carbonaceous material is difficult, and initially I envisaged a *Casuarina*-like fruit, or distinct ray and disc florets of a composite. My interpretation however is that the fossil represents a dicotyledonous flower, with 5 sepal and 5 petal parts.
petal parts.

Attachment to the flower of the associated leaf cannot be demonstrated but I believe it arises from the same plant.

Concluding Discussion

As already noted, fossil flowers are rare in Australian Tertiary beds. Duigan (1951) in her catalogue of Australian Tertiary flora listed only one, from Early Tertiary beds at Vegetable Creek, N.S.W. This was figured by Ettinghausen (1888), as *Getonites Wilkinsoni* and is approximately the same size as the Brandy Creek flower, but with smaller receptacle.





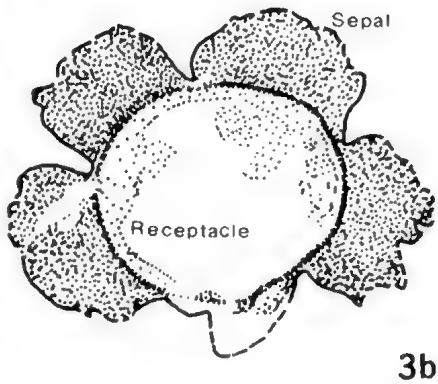
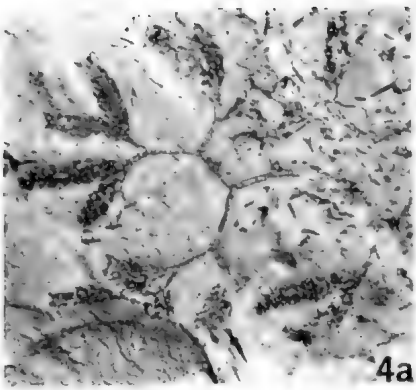


Fig. 2. a. Dicotyledonous flower x2, Brandy Creek mine.
b. Drawing showing interpretation of perianth parts.
Fig. 3. a. Cf. *Leptospermum* sp. x2. ALCOA brown coal mine, Anglesea.
b. Drawing showing perianth arrangement.

Gill (1950) figured inflorescences from near Hobart, and considered them to be probably Miocene in age, but did not include detailed description or suggest affiliations.

Christophel and Blackburn (1977) noted flowers in the Eocene flora of Maslin Beach, South Australia, but these have not yet been described.

In my work on Victorian Mesozoic floras (Douglas 1969) I suggested that an even older specimen (Cretaceous) from Koonwarra might be a flower, but I now regard this as a lacerated stem apex.



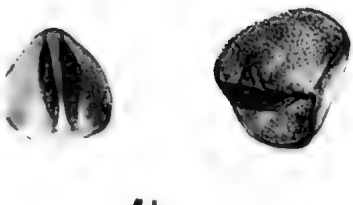


Fig. 4. a Fertile branchlet x2. ALCOA brown coal mine.
b Spores, xc300, indicating derivation from pteridophyte, macerated from fertile branchlet.

Maceration techniques* were used on the fossils in an effort to obtain microfloral evidence for comparison with present day genera, but no pollen aggregations were isolated. Maceration of another fertile branchlet (Fig. 4a) from the Anglesea collection initially suspected of angiosperm affinities resulted in the isolation of well preserved spores (Fig. 4b), indicating derivation from a pteridophyte, (fern), not a flowering plant.

*See article by Millett in Jan./Feb. 1978 Vict. Nat. discussing use of epidermal structures in plant identification

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Subscription Rates to Rise from 1 January, 1979

The Club's audited Statement of Income and Expenditure for the year ended 31 December shows that the cost of producing and despatching the Naturalist was over one thousand dollars more than our total subscriptions received. This amount plus our working expenses had to come from grants and interest from investments, etc.

We had a surplus of only $140 last year and this year we could show a loss. Council has prudently agreed to a small rise of $2 on all subscriptions except Juniors without Naturalist.

GARNET JOHNSON
Hon. Secretary, FNCV.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 104 in the previous issue)

BY JAMES A. BAINES

***Peucedanum.** Gk peukedanon, parsnip (see comments under *Pastinaca*).

***Phalaris.** Gk name for a grass of this genus, probably from phalos, shining; alluding to the shining appearance of the fruiting glume. Our four introduced species are all known as different kinds of canary-grass. The genus gives its name to the tribe Phalarideae in family Gramineae (Poaceae). Jaeger gives the origin as Gk phalaros, having a patch of white.

Phebalium. Gk phibalee, a kind of myrtle (first e short, second e long); or Gk phibaleos, a kind of fig-tree; latinized by Ventenat in 1805 as *Phebalium* with change of first vowel from i to e. The former derivation seems more probable, for, while the genus is in family Rutaceae, there is a superficial resemblance to myrtaceous species in the flowers, and certainly no possible likeness to the genus *Ficus* in Moraceae. The genus is restricted to Australia, except for one N.Z. species, Victoria having 15 of Australia's 40 species. It is strange that no common name, other than the generic name, has emerged for any of our species except *P. squameum*, Satinwood, a name used for Queensland and West Indian species of *Zanthoxylum* (Rutaceae) and for the Indian tree, *Chloroxylon swietenia* (Meliaceae).

Philydrum. Gk philos, loving; hydor, hydra, water; because it grows in shallow freshwater swamps. Our species, *P. lanuginosum*, Woolly Waterlily, is another plant masquerading as a lily, since its genus belongs not to Liliaceae but to Philydraceae, which gets its name from it. The specific epithet means woolly.

Phlegmatospermum. Gk phlegma, phlegm (originally meant heat); sperma, seed; the seeds being mucose when moistened. Our species, *P. cochlearinum*, has no common name, despite the 'jawbreaker' binomial; the specific epithet means spoon-shaped (latinized from Gk kochlos, a mollusc with a spiral shell, from kochlo, to wind or turn, hence Lat cochlea, snail shell, and cochlear, spoon), named from the compressed form of the seeds. It was first classified in *Eunomia*, then *Thlaspi* (family Cruciferae).

***Phleum.** Gk phleos, name of a reed, rush or grass in classical authors, said to be, according to Gilbert-Carter, *Erianthus ravennae* (Gramineae), and perhaps applied to this genus because of the crowded inflorescence. The species naturalized here, **P. pratense*, Timothy Grass, was called Meadow Cat's-tail until, after Timothy Hanson introduced it to New Hampshire from England about 1720, it was re-imported to England as St. Timothy's Grass by 1746! The full story is told by David McClintock in his 'Companion to Flowers', pp. 181-182. Now it is an important pasture grass in many countries.

New edition "Ferns of Victoria and Tasmania"

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A new species of gecko, genus *Cyrtodactylus*, from Cape York Peninsula, Queensland, Australia

BY G. J. INGRAM*

Abstract

Cyrtodactylus galgajuga sp. nov. is known only from the bare, black boulder mountains of the Trevethan Range near Cooktown, Queensland.

Introduction

There are two species of *Cyrtodactylus* (*C. louisiadensis* and *C. pelagicus*) recorded from Australia, where they are found in the Torres Strait Islands and northeast Queensland (Cogger 1975). Both occur in New Guinea and *C. pelagicus* is also found on the islands of the south west Pacific (De Rooij 1915).

Recently Brown and Parker (1973) described a new *Cyrtodactylus* from New Guinea and published a key to the species of the island. They used the pattern of the enlarged scales in the preanal region and on the under surface of the thighs for distinguishing the species. This was also found to be a useful diagnostic character for the new species described in this paper.

Abbreviations used in the text are as follows:— SVL, snout-vent length; TL, tail length; HW, head width; HDL, head length; AG, distance between the axilla and groin; FL, length of forelimb; HL, length of hindlimb; EW, eye width; TW, ear width; EN, distance between nare and anterior border of the eye; IN, internarial span. Ratios are given as percentages.

Cyrtodactylus galgajuga new species

Holotype

Queensland Museum J29474, collected by G. J. Ingram and D. Miller, near Black Mountain (15° 40′ S. 145° 14′ E), Trevethan Range, 22 km S of Cooktown on 1 January, 1977.

Paratype

Australian Museum R70110, collected by W. Hosmer at the same locality as above, in early 1977.

Diagnosis

A slim rock-dwelling *Cyrtodactylus* (plate 1) with the preanal and femoral regions covered by enlarged scales relative to the smaller scales of the anal area and the posterior surfaces of the thighs (plate 2), ten well defined rows of tubercles at midbody, no lateral skin fold, and six purplish transverse bands between ear region and hind limbs.

Distribution

Known only from the boulder mountains of the Trevethan Range, south of Cooktown, NE Queensland.

Description (meristics of holotype given first)

SVL 50 and 49. TL (tail of holotype broken) 119. HW/SVL 19 and 19. AG/SVL 42 and 42. FL/SVL 32 and 35. HL/SVL 53 and 50. HDL/SVL 29 and 29. EW/HDL 29 and 28. TW/HDL 8 and 9. EN/IN 50 and 50.

Head covered with small granules, smaller posteriorly and larger anteriorly; scattered pointed tubercles as far anterior as the interorbital region. Rostral large. Nostril bordered by the rostral, supranasal, first upper labial, postnasal and 2 small scales. Supranasals large, separated by one small scale. Upper labials 9, lower labials 7. Pair of postmentals separated by a large mental. Ten well defined longitudinal rows of pointed dark tubercles on dorsal surface of

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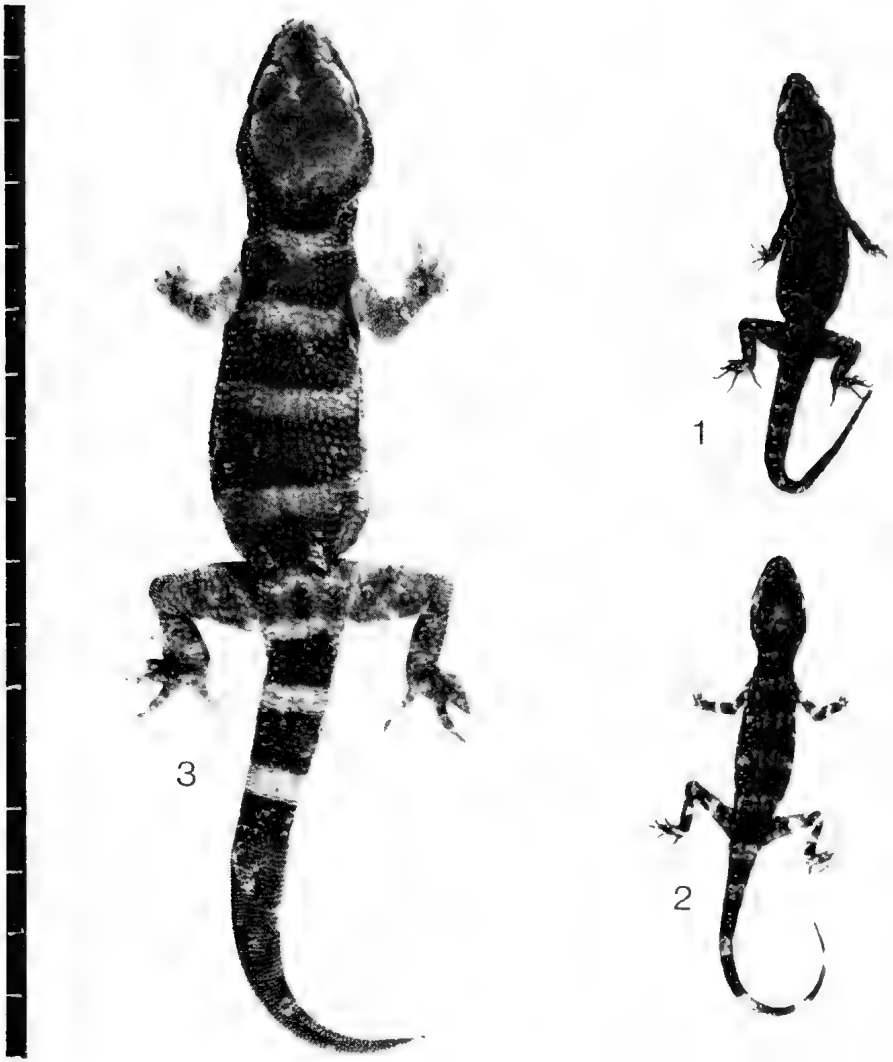

Plate 1
1. *Cyrtodactylus pelagicus* QM J25320, Home Rule, N.E. Queensland.
2. *Cyrtodactylus galgajuga* AM R70110 (paratype), Black Mountain, N.E. Queensland.
3. *Cyrtodactylus louisiadensis* QM J30063, 22 km E. of Chillagoe, N.E. Queensland (scale in centimetres).

midbody. Ventral surface covered by many small scales, becoming larger posteriorly (plate 2); scales between hind legs, very large and about twice the size of the surrounding scales; rounded scales on posterior surface of thighs very small, meeting larger flat scales of ventral surface of thighs which are about twice their size. Scales surrounding vent are smaller than surrounding scales. Scales under tail are the largest ventral scales. No femoral or preanal pores. Number of lamellae under fourth toe 17 and 16. Palmar tubercles large and rounded. Tail cylindrical.

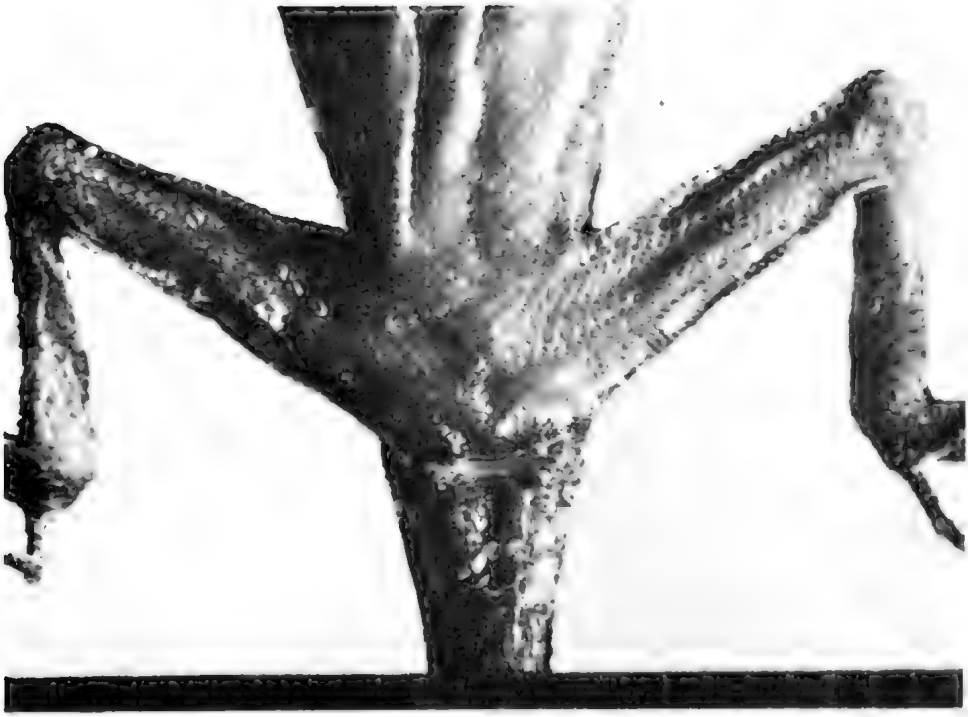

Plate 2
Under surface of thighs and tail of *Cyrtodactylus galgajuga* (scale in millimetres)

Colour in preservative

Dorsal surface of neck, body, tail and legs banded with purple-brown on a cream background. There are 6 bands on body, 4 on each leg and 7 on tail. Bands break up into purple and cream blotching on lower lateral surface of body. Head marbled with brown-purple and cream. Labials brown-purple. Ventral surface light brown; underside of tail lightly banded; ventral surface of toes and palms dark.

Habitat

The Trevethan Range is composed of bare, black, blue-green algae covered granite boulders (Zweifel and Parker 1977) although each mountain in the Range has a few isolated trees. The huge boulders piled one on another form caverns in which *C. galgajuga* hides by day. At night they emerge to forage on the boulder faces.

On the night of 1 January, 1977, they were uncommon with five individuals observed in an area of about 3200 square metres. They were very difficult to approach and usually scampered for cover once their eyes were caught by torchlight.

Etymology

"Galgajuga" is the territory name for Black Mountain in Gugu-Yalanji, the Bloomfield River language (Chris Anderson pers. comm.).

Comparisons with Other Species

C. galgajuga is readily distinguished from the very large robust *C. louisiadensis* by its small size and delicate, gangly habitus (plate 1). It also lacks the lateral skin folds and the many rows of tubercles dorsally and laterally. The ventral scales in the preanal region and on the undersurfaces of the thighs are greatly enlarged on *C. louisiadensis* and the latter scales meet the smaller scales of the posterior surfaces of the thigh along a well defined demarcation line (plate 3). *C. pelagicus* is very similar to *C. gal*

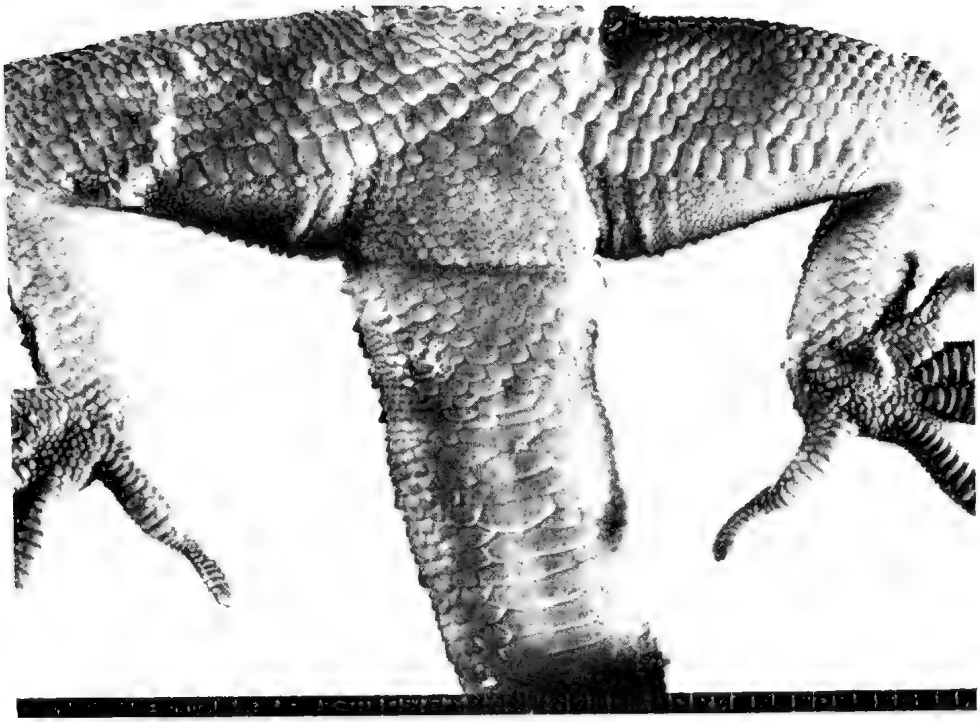

Plate 3
Under surface of thighs and tail of *Cyrtodactylus louisiadensis* (scale in millimetres).

Plate 4
Under surface of thighs and tail of *Cyrtodactylus pelagicus* (scale in millimetres).

gajuga but it differs with its robust neck, body, and legs (plate 1), greater number of rows of tubercles dorsally and laterally (greater than 13) with the tubercles more rounded, and with the ventral surfaces uniformly covered with small scales so that there is no difference in size of the scales on the undersurfaces of thighs and in the preanal region (plate 4).

Remarks

Cyrtodactylus galgajuga is the third new species of vertebrate discovered from the boulder mountains of the Trevethan Range. The other two species restricted to this habitat, are a microhylid frog *Cophixalus saxatilis* (Zweifel and Parker 1977) and an undescribed lygosomine skink of the genus *Carlia* (Wells 1975).

KEY TO THE AUSTRALIAN SPECIES OF *Cyrtodactylus*.

1. Preanal and femoral regions with one or more rows of distinctly enlarged scales 2
   Preanal and femoral regions covered by relatively uniform small scales (plate 4) ..... *C. pelagicus*
2. Lateral fold from axilla to groin with enlarged rounded tubercles; preanal and femoral regions with greatly enlarged scales (plate 3); maximum snout-vent length 16 cm ..... *C. louisiadensis*
   No lateral fold; preanal and femoral regions not with greatly enlarged scales (plate 2); maximum snout-vent length 5 cm ..... *C. galgajuga*

Acknowledgements

I thank C. Anderson, H. G. Cogger, J. Covacevich, A. E. Greer and F. Parker for their kind help in the preparation of this paper. Douglas Miller assisted me in the field.

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"Comments on the Feeding of Young Marsupials" — A Reply

We wish to reply to the criticism of our work (Stephens et al, 1974, Stephens, 1975) by Dr. Michael Messer (Victorian Naturalist, March/April, 1978, p. 61) made in response to an article by Dr. Elizabeth Turner entitled "Preventive Marsupialian Paediatrics" (Victorian Naturalist, May/June, 1977, p. 129) in which this work was cited.

Firstly, Dr. Messer had objected that our results on the activities of galactose-metabolizing enzymes were obtained with the red cells of adult animals, from which we made inferences relating to cataract formation in pouch-young marsupials. Although this was true, in subsequent experiments we had observed that pouch-young marsupials also had low enzyme activity similar to that of the adults (unpublished observation). We have also shown in a subsequent paper (Stephens et al, 1975) that pouch-young kangaroos have abnormal galactose tolerance which is corrected with age, and thus presumably with the formation of ruminant-like digestive system.

Secondly, Dr. Messer objected that the results were obtained with red cells whereas liver is the site of galactose metabolism. In analogous situation in humans where liver is also the site of galactose metabolism, the defects in galactose metabolism are reflected in the red cells, and the assay of enzyme activity in the red cells is used to diagnose two inherited errors of galactose metabolism, galactose-1-phosphate uridyl transferase deficiency (leading to classical "galactosemia") and galactokinase deficiency (leading to cataract formation).

Dr. Messer in his letter emphasized the fact that marsupial milk contains a variety of galactose-containing oligosaccharides and young marsupials may, therefore, be accustomed to metabolize galactose obtained from the hydrolysis of these oligosaccharides by the usual metabolic pathway. He suggests without any pertinent references to literature that the normal function of intestinal lactase is to liberate galactose from these oligosaccharides. However, we quote from his own recent article (Messer and Mossop, 1977), "the mechanism by which marsupial milk oligosaccharides are synthesised in the mammary gland or digested and absorbed in the intestinal tract of the pouch-young is unknown". It would thus appear incorrect to assume that intestinal lactase of the kangaroos may be responsible for the hydrolysis of the oligosaccharides containing galactose.

Although we do not claim to have demonstrated experimentally, that feeding galactose to pouch-young marsupials may cause cataract formation, we are impressed by the epidemiological evidence that cataracts occur only in orphan marsupials bottle fed with cow's milk. In a recent seminar held in The University of Sydney during 6-8 February, 1978 (The Postgraduate Committee in Veterinary Medicine, Proceeding 12036, Fauna — Part B) many clinicians interested in marsupial health have responded to our paper very favourably and recognised the importance of feeding "galactose-free" diets to young marsupials for the prevention of cataract formation. Dr. Messer's assertion that the hand-rearing of orphaned marsupials on lactose-free milk "has no scientific basis" ignores the very considerable amount of circumstantial evidence which has already been obtained in the field of veterinary clinical medicine. We believe, therefore, that it would be unwise to subject young marsupials to exposure to large quantities of lactose-containing material.

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Does the Koala need to drink water?

BY ROBERT DEGABRIELE*

The koala has been characterised as an extremely specialised arboreal folivore which has evolved so as to feed on a restricted range of highly toxic plants (the eucalypts) which are present in large amounts throughout the year. Such a specialisation leads to the prospect that the food supply may also provide an adequate water supply, especially in the light of the fact that koalas have been seen to drink water under natural conditions only rarely. In general terms, an animal is limited to a particular environment by such factors as the availability and quality of food, the thermal environment and the adaptation of the animal to that environment, and the availability of water together with the animal's water requirements. This paper is concerned with the last of these factors, water.

Studies of Natural Populations

The way in which koalas use water under natural conditions has been studied by following the movement of radioactively-labelled water. Measured quantities of this labelled water are injected into koalas which are then released. After at least a week the koalas are recaptured, a blood sample is taken from each one and the level of radioactivity is compared with the injected level. The comparison then leads to the calculation of total body water content and water turnover rate. When this technique was applied to natural populations of koalas at Magnetic Island (North Queensland), Sydney and Phillip Island, no significant differences were detected between the three populations with respect to total body water and turnover rate. This means that although the three supposedly different locations are inhabited by three different races of the koala, the microhabitat of the koala is rather constant, irrespective of location, and the three races act as one population.

The total body water measurements showed that the koala is three-quarters water, a fairly high proportion which is shared by other ruminant-like marsupials. This high level also confirms the observation that the koala's large caecum holds significant amounts of moist food.

The koala processes water at a faster rate than most other marsupials (it has a higher water turnover rate), suggesting that the koala's environment usually supplies sufficient water. An interesting comparison can be made between the koala and the short-nosed bandicoot. The water turnover rate of bandicoots living in a waterless island habitat is similar to that of koalas in nature. In both cases, then, the food supply also provides a water supply. Anatomical studies of the koala have confirmed that water appears to be abundant in the koala's microhabitat.

However, the water content of *Eucalyptus* leaves is quite low (about 45%), so further measurements were carried out on individually caged koalas in order to establish the way in which the water is used.

Studies of Caged Koalas

Koalas were kept individually in cages and supplied daily with freshly cut branches of grey gum (*Eucalyptus punctata*) and, in some cases, drinking water. Water turnover rate was found to be half or less than that of koalas under natural conditions. This raises the possibility that the slothful inactivity of koalas in nature may be useful in conserving water. Irrespective of the availability of drinking water, the most important input of water was via the leaves which provided at least 70% of the water consumed. This

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Koala
Phascolartos cinereus

might explain the koala's preference for gum tips which have a higher water content (65%) than the older leaves (45%).

The koala is able to conserve the water it has taken in by a number of mechanisms. Firstly, studies with antidiuretic hormone have shown that the koala produces as concentrated urine as it is capable of producing, even when drinking water is available. Secondly, the koala produces extremely dry feces, on a par with dehydrated camels. Thirdly, the koala is able to recycle urea and so reduce the volume of the urine produced.

Conclusion

When the koala's ability to conserve water is compared with its demands on water for evaporative cooling, it can be shown that the koala's water requirements can be supplied entirely by eucalypt leaves up to an air temperature of 30°C. The koala needs to drink, then, only when air temperature exceeds 30°C. Such an occurrence is likely to be rare when the koala's ability to actively choose a particular microenvironment in a tree is taken into account.

Six sun-bathing Echidnas

One chilly winter day as I was walking through the bush in the Warby Ranges a slight movement in the undergrowth caught my eye. The movement came from some echidnas *Tachyglossus aculeatus*. They were lying in a patch of sunlight with their soft furry abdomens exposed to the sun. There were six of them, placed side by side one behind the other in a line, and with their orangey-brown and black colouring they looked remarkably like a fallen disintegrating trunk of grass tree *Xanthorrhoea australis*.

As I watched, the smallest echidna got to its feet and approached me over a distance of about three metres until its long nose touched my shoe. Unhurriedly, it returned to its position near the end of the line.

Some minutes later I returned to the spot with my husband but we could find no trace of any of them.

I.C. Morris, South Wangaratta

A new locality for *Litoria brevipalmata* (Anura: Pelodryadidae) from South East Queensland

BY G. V. CZECHURA*

Introduction

McDonald (1974) recorded the presence in Queensland of *Litoria brevipalmata* Tyler, Martin and Watson. This record was based on the collection of two specimens, separately obtained, from Crows Nest National Park (N.P. 629; 152° 06'E, 27° 15'S) and Ravensbourne National Park (N.P. 492); 152° 12'E, 27° 21'S).

The recent collection of three specimens of this frog near Jimna (152° 27'E, 26° 39'S) therefore constitutes both an extension of range and a new locality for this frog in south-east Queensland.

Observations and Locality Data

Observations took place on the night of Sunday, 29 January, 1978. Heavy, intermittent showers resulting in the formation of many standing pools of water and moist substrate, were prevailing at the time. All frogs were collected in an area approximately 6 kilometres north-west from the township of Jimma, south-east Queensland.

The first individual was found near the gutter of an unsealed roadway. A search of the area for more specimens was immediately undertaken. This search resulted in the capture of the additional two specimens some 30 metres distant. This latter area was in the vicinity of a small creek, and supported extensive regrowth of the grass *Imperata cylindrica*. Grassy regrowth was restricted to small, short (3-4 cm height) clumps separated by areas of bare ground; both frogs were sitting on these patches of moist, bare earth. In addition another four frogs were located (but not collected) in similar situations here.

Subsequently, a single individual was observed near a small pond in a gravel quarry some 4 km north-west of Jimna. All frogs observed were males in breeding condition.

Table 1 presents a list of synchronosympatric frog species for both locations.

The vegetation present in the area from which the specimens were collected consisted of low, dry sclerophyll forest with a well developed grassy layer. The tree layer consisted of young *Eucalyptus* spp. and *Casuarina* sp. The dominant grass being the aforementioned *Imperata cylindrica*. Small patches of vine scrub (= low closed forest) with *Eucalyptus* spp. and *Tristania conferta* as dominant emergents, were also present in the vicinity.

The vegetation surrounding the gravel quarry was essentially similar to the former area. However, the dry sclerophyll forest appeared to have both a greater density and higher percentage of more mature trees, resulting in a taller tree stratum plus a reduced grassy layer. Adjoining the open forest were, again, areas of vine scrub.

TABLE 1. Synchronosympatric frog species with *Litoria brevipalmata* Jimna area, SE.Q.

Litoria caerulea
Litoria chloris
Litoria gracilenta
Litoria dentata
Litoria latopalmata
Litoria lesueuri
Adelotus brevis
Pseudophryne bibroni
Uperoleia marmorata
Limnodynastes ornatus
Limnodynastes terraereginae
Mixophyes fasciolatus

Call

Barker and Grigg (1977, p. 64) report the

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call of *Litoria brevipalmata* as a "series of short quacking notes". Calls which may be described in this manner were heard at the collection site; in one case, a *L. brevipalmata* was found near the point of origin of such a call.

In captivity, the three individuals have been heard making soft, clucking noises similar to a very slow and harsh *L. latopalmata* call.

Discussion

L. brevipalmata is easily distinguished from all sympatric frogs on the basis of the lime-green and black thigh, groin and axillary colouration in addition to the features reported in the original definition (Tyler, Martin and Watson, 1972, p. 82). Cogger (1975) and Barker and Grigg (1977) have previously indicated the importance of the presence of the lime-green colouration for field identification.

The presence of *L. brevipalmata* in the Jimna area is an extension of some 80 kilometres north from the previously recorded locations. The Jimna area is included within the Conondale Range complex of south-east Queensland. Czechura (1975, 1976) has previously reported on the rainforest/wet sclerophyll dependent herpetofauna of this area.

L. brevipalmata, however, seems to be a representative of an interesting "dry" forest adapted fauna which reaches its greatest development in the drier country north of the rainforest/wet sclerophyll areas previously studied. Here the rainforests and wet sclerophyll forests are replaced in dry vine scrubs and open, dry sclerophyll forest respectively. Very few typically rainforest forms frequent the vine scrub formations (one exception being the agamid lizard *Gonocephalus spinipes*). Frequently the rainforest/wet sclerophyll herpetofauna are replaced by a congener in this area, (the snakes *Hoplocephalus stephensi* and *H. bitorquatus* respectively) or are restricted to gallery forest (e.g. *Litoria pearsoniana*).

On the whole, composition of the "wet" and "dry" adapted faunas is quite dissimilar; differences reflected on the generic as well as the specific level. For example, *Litoria dentata, L. brevipalmata*, the macropods *Aepyprymnus rufescens, Petrogale penicillata* and *Macropus dorsalis* all lack close relatives in the "wet" development.

Acknowledgements

I wish to thank my wife Robin, Chris Pollitt and Elaine Robinson for field assistance.

Mr. Glen Ingram, Curator of Amphibia, Queensland Museum for aid in preparation of this contribution.

Lastly, I would like to thank Ms. R. Owens for typing the manuscript.

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Note on Aboriginal wooden vessel called tarnuk bullito or tarnuk bullarto

Dr. L. A. Hercus has kindly pointed out that bullito, bullarto means 'big' and is found in several aboriginal vocabularies of the Melbourne area. See *Vic.Nat.*, 95:54.

Editor.

Radiocarbon Dating of the Volcanoes of Western Victoria, Australia

By Edmund D. Gill

The third largest basalt plain in the world above sea level exists in Western Victoria. It is C. 15 000 km² in extent, and has three components. Ancient decomposed basalts belong to the time of violent earth movements in the Lower Tertiary when Australia and Antarctica separated. The second component forms most of the present land surface, and belongs to the Upper Tertiary. Most of these basalt flows are Pliocene, and date from 4.5 m.y. old (Joyce 1975). The third component comprises the volcanic hills of tuff and scoria with minor flows of basalt.

Maghemite Dating

Before radiocarbon dating was invented, many despaired of ever dating these volcanic hills, their soils and their archaeological sites. Challenged by the problem, I worked out a method of relative dating based on the accumulation of magnetic iron oxide (maghemite) in tuff soils. The idea is that in a common matrix (tuff) under a common climate on a common terrain slope (the gentle declivity of the tuff cones), maghemite accumulates according to age as dust, minute nodules, and so up to pea-sized buckshot gravel. At that time no one (as far as I could find out) had looked at these growth stages of the nodules. It was also noted that manganese dioxide (pyrolusite) increases in quantity with age.

A different scale applies to the basalt flows because weathering is slower and the surfaces are usually flat. The tuff series covers soils of increased depth from thin uniform soils to duplex (with A and B horizons) soils a metre deep. A farm valuer gave me average prices for land in the areas studied, and they were in inverse proportion to age, i.e. the older land is more leached and so cheaper. When radiocarbon dating became available the tuff series up to the buckshot gravel stage could be dated, i.e. Mt. Leura complex C. 22 000 years. The maghemite method is still useful for areas where no samples for C14 dating can be found. The Red Rock complex N.W. of Colac was dated by this method, then refined with radiocarbon, as described later in this paper.

Tower Hill Volcano

Tower Hill (Pl. 1, Fig. 1) was so named by Captain Flinders when exploring the coast in *The Investigator*, but about the same time the French Captain Baudin sailing the same coast in the *Géographe* called it Piton de Reconnaissance. Hence the ejectamenta of which the hill consists is called the Piton Scoria (Gill 1967). This explosive volcano, situated significantly at the change in direction of the coast west of Warrnambool, had a short life. It spread ash and lapilli up to 75 m thick over the landscape, but the thousands of thin layers carry no record of a rest in activity.

When Professor Willard F. Libby invented C14 dating, I heard of it before publication through Dr. Kenneth Oakley of the British Museum, who suggested that I forward a couple of samples for dating. I wanted to date Tower Hill, but long search failed to discover any datable material such as fossil wood from the Tower Hill tuff sections, so samples from Tower Hill beach and Goose Lagoon were sent (Gill 1955). These were the first radiocarbon dates on Australian samples. They were assayed by the solid carbon method. When gas counters were invented, smaller samples could be used, and a search was made for juvenile soils from which carbon could be concentrated, but without success. Samples were later dated (Gill 1967) from above the tuff (up to 5280 years on charcoal) and below it

Plate 1, fig. 1. Tower Hill volcano, west of Warrnambool.
fig. 2. Roadcut at North Cundare, E. side of road running S. from road to Alvie. Yellow loess overlies a *Coxiella* band, which overlies a fossil soil.
fig. 3. East shore of Lake Corangamite at North Cundare. Low terrace behind beach, and high terrace above it, and in distance. C14 samples from near tip of headland.

(5850 years on an insufficient organic fraction in bones from Bushfield, and 6605 years on bone carbonate — Gill 1953, 1971). When more was learned of bone dating, it was apparent that the Bushfield dates were not very reliable. Moreover, they did not fit the sea level data. A somewhat more satisfactory age was achieved by the assay of marine shells in highly tuffaceous lime sand at Pickering Point, Warrnambool (Gill 1972). Two kinds of tuff deposit are found — the stratified ash that has not been disturbed since it fell, and the unstratified material that occurs in high areas disturbed by the wind and in stream channels disturbed by the water. Loose volcanic ash is the most erodable of sediments, and so it is significant if an unstratified deposit in an exposed site like the clifftop at Point Pickering is still rich in tuff. Recently a stratified subaerially deposited (not water laid) tuff has been found under the Lake Pertobe marine shell bed at Warrnambool. Various parts of this shell bed have dated 5820, 6500 and 6570 years respectively. The top of the tuff is weathered, and its structure shows it was air laid, so the sea must have been lower then. After the tuff was deposited, the sea advanced over the Lake Pertobe area, reaching as far as the railway station and the high ground behind the Woollen Mill; it penetrated up the Merri River also because its level was 1.5-2 m higher than at present. When the resources are available, an undisturbed core will be taken at a couple of places through the freshwater peat of Lake Pertobe, the marine shell bed, and into the tuff, to follow in detail the advance of the sea, then its retreat to its present position. This was not a simple advance and retreat, but some oscillations of level took place. Shells from immediately over the tuff will be dated, and this will help define more accurately the time of eruption of the Tower Hill volcano.

Among dates in the same area that are older than the tuff is one of 8700 years for mammillary calcite at Dennington. So the eruption occurred between 8700 and 6570 years ago. The 7300 year date is in the correct time bracket.

It is interesting that the Tower Hill volcano is of the same order of age as Mt. Napier, Mt. Eccles, Red Rock near Colac, and other volcanoes shown by maghemite dating to belong to the same age group. The only younger dates for this volcanic field are in the Mount Gambier area of South Australia (Blackburn 1966).

The University of Sydney Radiocarbon Laboratory has recently announced that the oceanic waters round Australia have a radiocarbon age of 450 years, which must therefore be subtracted from the dates of marine shells grown in those waters. The midden shells in tuff at Point Pickering at Warrnambool must therefore have their C14 date reduced to 6850 years — the nearest date so far to eruption time.

Mt. Napier and Mt. Eccles Volcanoes

South of Hamilton is the prominent scoria cone of Mt. Napier — a former fire fountain. It is part of a series of volcanic formations and resultant swamplands (produced by the damming of drainage) that zigzag across the terrain in a succession of linear deposits roughly at right angles to one another (see map Gibbons and Downes 1964). Thus Buckley's Swamp, caused by Mt. Napier blocking the drainage, extends approximately north as a narrow marsh from the east end of the volcano, while a long narrow lava flow extends west from it along Harman Valley. This meets a swampland that extends both north and south from the junction. At its south end is the Mt. Eccles volcanic complex that extends roughly east-west. At the east end of this complex is a narrow swampland that extends north to McArthur, while at the west end is Condah swamp, a wetland overlying a lava flow or flows. From these lava fills a valley extending roughly south through the Last Interglacial duneline to the sea, and beneath in (Butakoff 1973, fig. 20).
two points:

1. In Buckley's Swamp, the base of the peat caused by Mt. Napier blocking the drainage dated 7240 years (Gill and Elmore 1973). This is a minimal date for the eruption, but probably close to it. It is a date on

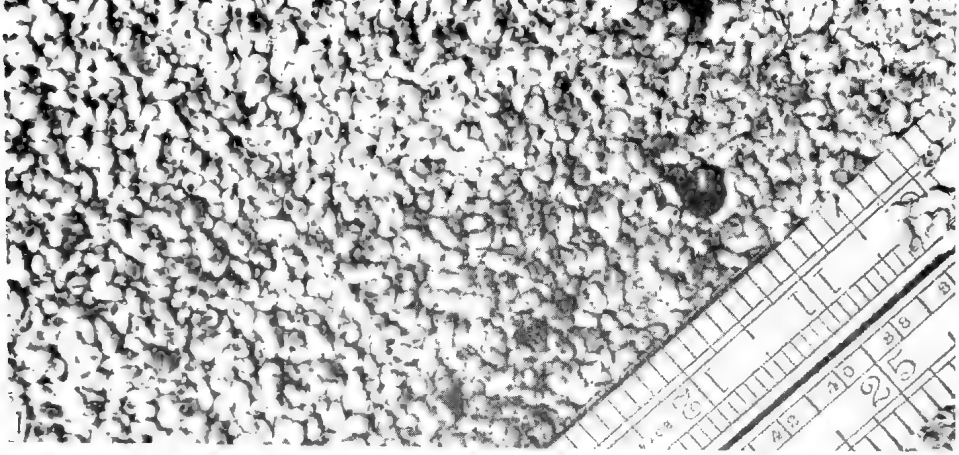

Plate 2, fig 1. *Coxiella* shells on the modern lake shore, a parallel to those dated by C14.
fig. 2. Close up of the fossil soil and *Coxiella* band in the roadcut at North Cundare dated by C14 (Pl. 1, fig. 2)
fig. 3. The low cliff of the Holocene terrace shown in Pl. 1, fig. 3. The upper and lower shell horizons dated 2020 and 4040 years respectively.

carbon and so does not need the deduction of 450 years.

2. In Condah swamp at Breakaway Creek, swamp and pond sediments up to 2.7 m thick overlie the basalt flow which could be from Mt. Napier, or a flow from Mt. Eccles that ran up the valley northwards due to the piling up of the Eccles complex, or both. Field work is needed to sort out the history. My present opinion is that, because the lava surface shows evidence of a high gas/lava ratio, it is more likely to be from the much closer Mt. Eccles. The date for the base of the peat over the basalt flow is 6235 years (Gill and Gibbons 1969) so Mt. Napier and Mt. Eccles must have erupted about the same time.

Red Rock Volcanic Complex

Northwest of the town of Colac is an extensive complex of cones, craters and crater lakes. A cone with lookout at Alvie is called Red Rock. By maghemite dating it is of similar age to Tower Hill, Mt. Napier and Mt. Eccles. I took the Colac naturalists there, and they wanted to know its age. No organic matter for dating could be found in its ejectamenta, but there is a high percentage of carbonate derived from the Miocene Post Campbell Limestone below, proved by the presence of marine fossils in the scoria. During soil formation this Miocene carbonate, devoid of radiocarbon, was taken into solution then precipitated on drying by taking up carbon dioxide (and so radiocarbon) from the soil air. A radiocarbon assay of this soil carbonate gave an age of 7810 ± 115 years (SUA-268), a date not previously published. This is a new approach to the dating of volcanoes, and is widely applicable. Relative age can be determined by maghemite dating, and then a more precise age by radiocarbon. Sooner or later carbon, shells and soil carbonate will be obtained from the same ash spread, and the dates can then be checked against one another.

To the west of Red Hill is Lake Corangamite, on the east shore of which tuff overlies the dunes (lunettes) of yellow silt (Colongulac Loess). A road cutting at North Cundare (military map ref. 628 956) revealed a bed of the brackish water gasteropod *Coxiella* that gave an early C14 date of 28 240 ± 1100 years (Y-230). These shells are not good dating material and so when many years later the cutting was deepened and revealed a fossil soil below the shell bed, an attempt was made to date carbon from it. The roadcut showed (Pl. 1, fig. 2; Pl. 2, fig. 2):

0.3 m Black crumby to small blocky clayey soil at the surface.

2.7 m Pale yellow 5Y 7/3 loess grading to light brownish gray 2.5Y 6/6 to grayish brown 5/2 with *Coxiella* fragments. At the base is the shell bed that provided the original sample for C14 dating.

0.38 m Dark brown 7.5YR 3/2 blocky clayey soil dipping south at 7°.

0.9 m Light olive gray 5Y 6/2 loess.

The Soil Conservation Authority kindly assayed the carbon content of the fossil soil, on the basis of which a 700 gm sample was provided for dating. The preparation method used reduced the carbon available for dating to 1.5 gm, but a date of 15 220 ± 530 over 320 (GaK-3214) was obtained. Further west at Lake Colongulac (Gill 1953) a date of 21 100 years was obtained for charcoal from the base of the lunette (Gill 1971). The dry period during which these lunettes were built ranged from about 20 000 to about 9000 years ago in Western Victoria. All this fits very well, but what about the shells *over* the fossil soil dating about 13 000 years more? The difference is too much to be explained by any inaccuracy in the dating. Perhaps in the dry conditions the wind excavated a fossil shell bed, and blew the old shells up over the new land surface. From the point of view of dating volcanoes it should be noted that:

1. The volcanic eruption was a later event than the lunette building because the tuff overlies the lunette.

2. The eruption was much later than 15 220 years ago because only about a quarter of the lunette was built then.

3. The eruption was before the lake terrace on the east shore was built because it is not covered by the tuff. Radiocarbon dates have been obtained for this terrace (Pl. 1, fig. 3; Pl. 2, fig. 3).

In July 1967 the lake level was fairly low, and below the Cundare cutting the cliff in the lakeside terrace measured 2.4 m high. There is also a higher terrace. Samples were taken of two horizons or *Coxiella* shells in the cliff (Pl. 2, fig. 3). The upper dated 2020 ± 90 years (GaK-3215) and the lower 4040 ± 120 years (GaK-3216). On this evidence the date of the eruption lies between 4040 and 15 220 years ago, so the date on soil carbonate of 7810 years is very reasonable. The bracket of dates in this section has not been previously published.

Mount Leura Volcanic Complex

Camperdown is built on a volcanic terrain with three prominent craters — Mt. Leura, Lake Bullenmerri and Lake Gnotuk (Gill 1953). The ridge between Mt. Leura and Lake Bullenmerri appears to be a fault line. The tuffs of these volcanoes overlap and are probably penecontemporaneous. Camperdown overlooks Lake Colongulac, in which bedded tuff is found. Over the tuff is a lunette with a basal date of 21 100 years (Gill 1971). Under the tuff is a bone bed with the remains of extinct giant marsupials, an horizon found in many of these lakes. For example, Lake Weeranganuck, which lies between Lake Colongulac and Lake Corangamite has such a bone bed also covered with a lunette. There are problems of dating in this area, but I think the following indicate the correct orders of age for the beds at Lake Weeranganuck:

11 980 ± 20 years (SUA-266) for carbonate nodules in the soil on the Colongulac Loess lunette above the bone bed.

25 300 ± 1200 years (GaK-986) for *Coxiella* shells from the bone bed under the loess lunette.

These dates have not been published previously. The first belongs to the final stage of the dry period during which the lunettes were built. Such carbonate nodules have been used elsewhere successfully, and indeed I was the first to use them for this purpose (in connection with the Talgai Cranium investigation). Judging by other *Coxiella* dates, that from the bone bed may be on the young side. On the other hand, the date of 21 100 years for the base of the lunette at Lake Colongulac is based on an ample sample of charcoal assayed by the Institute of Nuclear Sciences (DSIR) in New Zealand. On the foregoing evidence, the eruption lies between 21 100 and 25 300 years. As the tuff at Lake Colongulac is finely layered and no evidence has been found of its erosion, and as air-laid tuff on the lake floor shows it was more or less dry then (a condition for lunette formation), the eruption was probably quite close to the time of commencement of lunette building. Say we express this for the time being as about 22 000 years ago.

The soil on the tuff is duplex, and contains pea-sized maghemite nodules, i.e. buckshot gravel. The tuff ring at Mt. Warrnambool has in its soil micronodules of a couple of millimetres diameter, and so is believed to be between Tower Hill and Mt. Leura in age.

Radiocarbon Dates for Victorian Volcanoes

The dates for the volcanic eruptions in Western Victoria have yet to be refined, but their order of age as presently known is:

		years
Pleistocene	Mt. Leura complex	22 000
Holocene	Red Rock	7810
	Mt. Napier	7240
	Tower Hill	6850
	Mt. Eccles	6235

PS. Since the above paper was written, the Mt. Eccles area has been re-visited. A *series* of volcanic events have occurred; e.g. the basalt at Ettrick lies on a river bed dated 19 300 yr by C14. Mt. Eccles itself is Holocene, while the tuff of the McArthur area is late Pleistocene. At least three ages of volcanic materials are thus present. A series of volcanic events has also now been distinguished at Camperdown.

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Range of Day Moths

In the swamps behind Biddy's Cove on Wilson's Promontory, 13/2/77, many black and white day moths of the family *Agaristidae* were flitting about the flowering plants. One was captured and identified as *Phalaenoides tristifica*. In its caterpillar stage the larvae feed on Epilobium, the Willow Herb, which was not uncommon there. This is, perhaps, not particularly noteworthy, save for the fact that some years ago we found the same species fairly common on the summit of Mt. Howitt, surely a considerable variation in its range.

ELLEN LYNDON, Leongatha

Field Naturalists in Northern Territory form Club

Last summer, the Northern Territory Field Naturalists Club was formed by enterprising naturalists in the Darwin area. They thought "that such a club had a good chance of succeeding, as there is not much else to do in Darwin on week-ends except go bush" — so writes Stephen Harwood, the Treasurer, who is also a member of the FNCV, and former member, and Secretary, of the Mammal Survey Group. The other office-bearers are Pat Rowan (President), Keith Martin (Secretary), Stephen Swanson (Field Trip Coordinator) and Elizabeth Eskbergs (Archives Officer). The club is now about one hundred strong. It meets on the second Wednesday of every month at 8 p.m. at the Darwin High School theatrette, Bullocky Point, Darwin. Stephen also writes "we put out an informative and often hilarious monthly newsletter to keep members informed of what they missed if they didn't come on the last field trip, and to what place we hope to visit in the coming month". But plans for a magazine are as yet indefinite because of the high cost of production. The first issue was to appear in May, and a further issue is scheduled for November. The new club will try and assist FNCV members with any information on the Territory, and invites Interstate Membership. Stephen's address is 6 Kelly Place, Rapid Creek, N.T., 5792, and Keith Martin's, 7 Chapman Court, Nightcliff, N.T., 5792.

The FNCV has sent a letter to the new NTFNC with congratulations to its foundation and best wishes for every success.

Juicy Fruits of the Otways

FNCV Easter Excursion, 24-28 March 1978

By Mary K. Doery*

"Season of mists and mellow fruitfulness" wrote the poet John Keats, and experiences in the Apollo Bay area were true to this quotation. The fascination and beauty of colourful and juicy fruits tempts one to feel, smell and perhaps to taste; using one's senses helps in the identification of the plant. Group discussion on the site of the specimens and the use of references have helped to make the following report.

Coastal areas

On a visit to the Cape Otway heathland, Seabox *Alyxia buxifolia* was found on the cliffs. Its orange to red drupes were on the same branch with the fragrant white flowers. Coast Ballart *Exocarpus syrticola* was also found here. It was identified by the lilac-pink succulent fruit-stalks, each supporting a hard small fruit. Shrubs of Coast Beardheath *Leucopogon parviflorus* had hundreds of globular white berry-like fruits which, due to their ripeness, easily dropped when touched. These fruits are edible.

Along the Great Ocean Road between Apollo Bay and Marengo, Seaberry Saltbush *Rhagodia baccata* made a show of flat, berry-like dark red fruits.

At other coastal strips and alongside Carisbrook Creek estuary, festoons of Coarse Dodder-laurel *Cassytha melantha* smothered host plants. The berry-like fruits were round, green to black, glutinous when squashed, and each with one centrally-placed hard seed.

Inland forests

At Paradise near Apollo Bay, Banyalla trees *Pittosporum bicolor* had fruits hanging from short stalks, each fruit with its two valves splitting to expose numerous mahogany-red sticky seeds.

Near Mait's Rest Reserve, Rough Coprosma *Coprosma hirtella* showed clusters of deep red to brown drupes. Such signs of fertility were on shrubs which would have had female flowers only, for these plants are unisexual. The fruits are edible but unpalatable. They are described as sweetish but not pleasant.

At the edge of Melba Gully State Park grew Purple Apple-berry *Billardiera longiflora* — a climber. The pendulous, deep purple-blue, shining berries showed to advantage above a red-brown earth bank. Numerous small seeds are found within the pulp.

Observed while travelling along Turton Track, on the embankments was Tasman Flax-lily *Dianella tasmanica*. It had many deep blue berries hanging from an upright stem.

Towards Carisbrook Creek Falls, Privet Mock-olive *Notelaea ligustrina* was found with its purple almost black fruits, ripe and round, many of which had fallen on the track. In another inland forest area, this small tree was again found bearing large compound clusters of pink to deep pink fruits. The fruits were distinctive against a backdrop of sombre green bush.

In conclusion, it is interesting to speculate about juicy fruits eaten by aborigines and experimented with by early settlers in the Otway region of Victoria.

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Glow-worms of the Otways

FNCV Easter Excursion, 24-28 March 1978

By Frank Robbins*

Glow-worms seem to be widespread in the wetter parts of the Otway Ranges, but the species has not yet been identified. This is because no adult specimens have been captured and sent to the experts in Canberra or Sydney. Dr. A. Richards is the present Australian expert, University of N.S.W Capture is difficult as the adult is like a gnat or mosquito, and belongs to the fly order (Diptera) — insects with only two wings. (Note that the "glow-worm" is not a worm, but a larva — the young stage of most flying insects.)

The famous glow-worms of New Zealand are well documented and attract enormous tourist crowds at Waitomo limestone caves, but the same species can be seen in damp places all over New Zealand. The name is *Arachnocampa luminosa* (Skuse), Edwards, 1924. Three very similar species are known in Australia: *A. tasmaniensis* Ferguson, 1925, from Ida Bay Caves in Tasmania, in total darkness ¼ mile from the entrance, *A. Richardsae* Harrison 1966 from the Blue Mountains of N.S.W. (disused railway tunnel), and *A. flava* Harrison, 1966 from Numinbah, Queensland. All are very similar and it is likely that our Australian species have a similar life history to the New Zealand species.

The glow-worm (larva) lives in a little tubular "hammock" or web along which it can move. Usually, this is found in an overhanging ledge in a wet valley bank or road cutting. If threatened, it leaves the "hammock" and quickly retreats into the recess behind the "hammock" from which hangs a curtain of fine vertical "fishing lines". Beads of sticky mucin are attached to the lines (similar principle used in spider silk).

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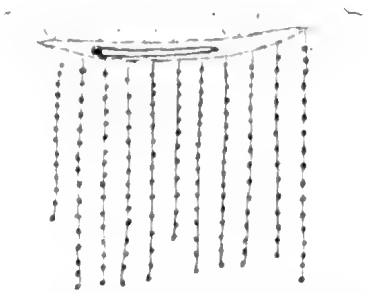

Fig. 1 Glow-worm hammock with fishing lines

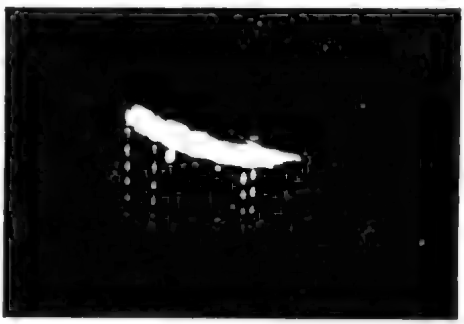

Fig. 2. Glow-worm light and fishing lines taken by worm's own light — "worm" moved along hammock during 20 minutes exposure. Photo Peter Ellis

At the tail end of the glow-worm is an organ which can produce light "without heat". The light is continuous and its purpose is to attract "midges" or other small insects that live in damp places. The insect gets caught in the "fishing lines", the glow-worm moves along the hammock, hauls up the relevant lines and eats the trapped insect.

In the beautiful fern area of Melba Gully State Park beyond Lavers Hill, we had no difficulty in finding the hide-outs of many glow-worms even though it was daylight; they were indicated by the fine vertical fish-

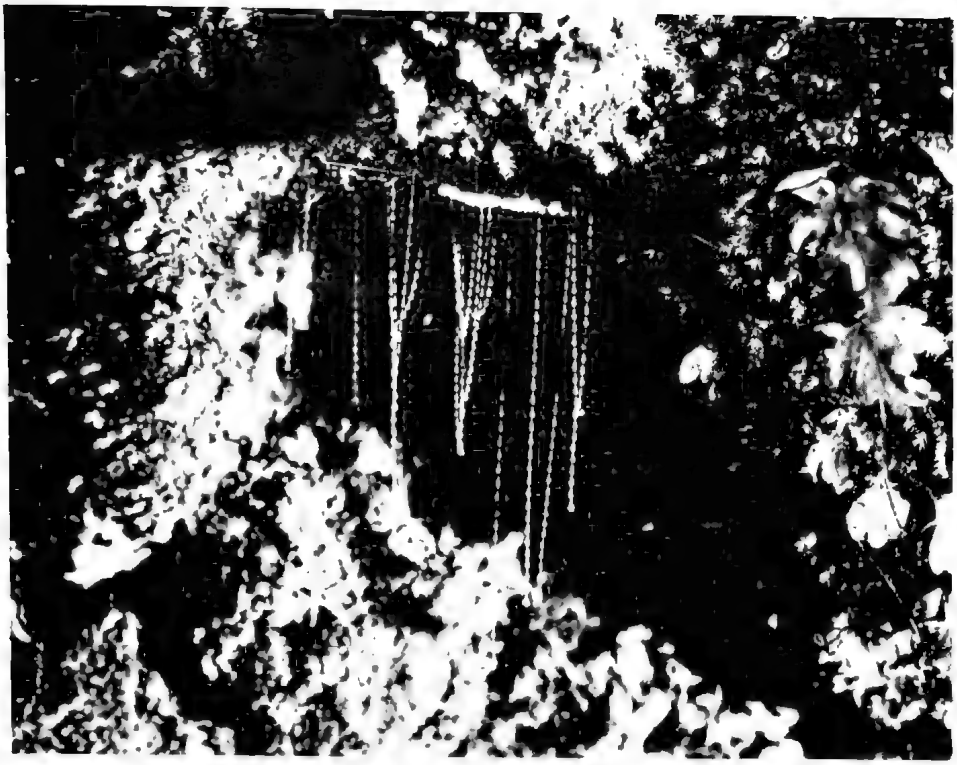

Fig. 3. Double exposure — time exposure followed by flash — showing beads of mucin on threads as well as light of larva as it moved along hammock. Photo by P. Ellis.

ing lines hanging from the glow-worm hammocks. The place to look was always under overhanging ledges in the sides of banks.

On another day, when we visited the Grey River Scenic Reserve near Kennett River, I used a torch to show how easy it was to see the delicate curtains of glow-worm threads with their little mucin beads glistening in the light. If you try to catch a glow-worm larva at night, using a torch and a twig, you have to be quick, as it usually makes a hasty retreat back into an inaccessible crack behind its fishing lines.

The Otway fishing lines are mostly one of two inches long. In New Zealand areas, where there is no wind, lines up to 18 inches long have been reported.

The ranger at Melba Gully told us he conducts night visits to see the glow-worms, and he has seen numbers of the adult insects flying around in January. The adult also has a light in its tail, but the emissions are intermittent. It was suggested that the ranger might catch both males and females for identification.

The usual way of procuring an adult is to find a pupa hanging vertically by a thread near the glow-worm home, take it away in a bottle, and wait for the adult to emerge, which should happen in a week or more.

In the wild, the male fly often waits at the pupa of an emerging female to fertilise her. She then flies away to search for suitable places in damp overhanging ledges to lay her eggs, after which she soon dies. The eggs soon hatch out into tiny larva, each with a glowing tail, and each sets about making its little fishing line snares to catch food. How much food is available through

the cold wet winter is not known, and I am only guessing that the glow-worm larva gradually grows to perhaps an inch, and by January (my guess), it changes into a pupa suspended by a thread. Within perhaps 12 days, out comes the full-grown two-winged fly ready to start the cycle all over again.

To my knowledge, no one who lives in a glow-worm locality, or visits one very often, has ever kept watch on glow-worm hides, so we don't know what happens during the year. Perhaps, the ranger at Melba Gully could help solve this question. It is only a matter of placing markers at a number of glow-worm hide-outs, and visiting them at short intervals, both night and day, to check on the light and the fishing lines. I think that at least two years' watch would be needed to find out the life story of the Otway glow-worm, and the species could be identified at the same time.

In 1976, January, Peter Ellis, of Bendigo Field Naturalists, and I spent two nights photographing and collecting glow-worms at Grey River. Peter obtained rather unique photos of the beautiful fishing line curtains, both by flash and by the light of the worm itself, including double exposures combining these. At home, I tried to rear the "worms" I caught in a bottle, but the trouble was to find enough tiny insects as acceptable food. After 10 days, their lights went out, although they had spun little fishing lines in my bottle.

The Koala — Some Corrections of the February Issue

Having studied the behaviour of koalas at Brisbane's Lone Pine Sanctuary, may I make two small corrections to M. J. Lester's otherwise excellent review?

Firstly, the mother's milk supply does not become insufficient before the young is able to leave the pouch, nor are the special faeces produced by the mother used as a supplement. Although it has never been proved, they probably serve to transfer to the young the micro-organisms required for proper digestion. They are consumed over a period of several weeks, but certainly not once a day.

Secondly, although the idea has been thoroughly popularised by Troughton (1941), the name "koala" does **not** mean "no drink animal". The name is easily recognisable as *gula* in Holmer's (1967) vocabulary of Kattang, a language once spoken between Pt. Macquarie and the Hawkesbury River. Similarly, the variant "culawine" is recorded as *gulawanj*. To understand this it must be remembered that the pronunciation of aboriginal languages is highly flexible. *G* and *k* are interchangeable, and are by convention written "g". In the same way, there is confusion between *u* and *o*. *Gula* would thus be pronounced "koolah" or "koala" ("oa" as in *oak*).

The point to be made is that in this language "don't drink" is *bitjagi giwi* and "water" is *batu*. The name of the koala, like that of most other animals, bears no relation to any other word. It is true that koalas can go without free water for long periods, but when they do drink they drink for several minutes. I have seen it on scores of occasions.

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Victorian Naturalist Subject Index 1884-1977

This is now in the final stages of proof reading and will be published before the end of 1978.

The Victorian Naturalist has been one of the major journals for reporting research on Victorian natural history as well as catering for the layman in this subject. The subject index will be an essential tool for anyone with an interest in the the botany, fauna, geology or entomology, etc., of Victoria in particular and South Eastern Australia in general. For example, it is virtually the only approach to articles written on the natural history of particular localities.

The subject index is being published with the aid of a grant from the Government of Victoria and will be priced at $14. FNCV members price will be $10. However, there will be a prepublication price of $8.50 for those who order and pay for it before the end of August. For members, this will be extended to 15 September. The number of orders received by then will influence the number of copies printed. (The Author Index, published in 1976 went out of print within about 6 months.)

Please indicate whether you wish to have it mailed (add postage 90 cents within 50 kilometres, $1.15 within Victoria, $2.25 N.S.W., S.A., Tas., $2.60 Qld., N.T., W.A.) or will collect it at a meeting or from Oakleigh, Clayton, Frankston, Hawthorn, Williamstown or Brunswick Public Libraries. Please send your name and address with $8.50 for each copy plus postage if it is to be mailed to:

Victorian Naturalist Index Project,
C/o National Herbarium,
Birdwood Avenue,
South Yarra, 3141.

Book Reviews

Flora of South Australia
Part 1. — Third Edition

Revised and edited by John F. Jessop, of the State Herbarium of South Australia.
6 July, 1978. Price $16.90.
Printed in Australia by the Government Printer D. J. Woolman.

J. M. Black published the first volume in 1922 when only 500 species of Monocotyledons were known in the State.

The second edition in 1943 listed about 650 species. Now about one fifth of all monocotyledon species now recognized do not appear in the second edition.

In 1964-5 H. J. Eichler edited a Supplement to all four parts of the second edition. Part 1 of the second edition had 253 pages while the present third edition has 466 pages and a map outlining zones in South Australia. This volume includes Lycopodiaceae to Orchidaceae.

As in former editions it has a glossary of botanical terms. A new key to all the vascular plants of the State is given. A note on the use of Keys and advice on collecting and despatching specimens is included.

As in former editions, helpful sketches accompany a very high percentage of the species.

Very many new species and some new genera are described and illustrated. A notable improvement is the detail in the greater number of orchid species carefully illustrated, including those of the varieties.

Sixteen pages of fine coloured plates, illustrating 21 species, mostly orchids, are inserted in the centre of the book, inciden-

tally in the middle of the text on Gramineae (Poaceae). Calectasia and Xanthorrhoea have not been awarded family status as in Calectasiaceae and Xanthorrhoeaceae in some other States but are still included in Liliaceae.

It is good to note the careful illustrations of five species of the family Lemnaceae shown, as well as the sporocarps of five species of Marsilea.

There is a massive alteration of species and some genera names of the second edition, some of which had been noted in the Supplement.

A striking example of change is that of the little fern which changes from Gymnogramma to Paraceterach.

Users of the Key are invited to let the Editor know of problems and suggestions when they have tried the Key so it can be corrected and improved in a later edition.

The quality of the paper and cover make it a much more durable book than former editions.

This is a most valuable book for naturalists in Victoria as well as South Australia as so many species are common to both States.

L. M. WHITE.

Science Field Guide — Barnacles

by A. J. Underwood

Published by: Reed Education. Price $2.95.

This small very useful field guide is one of the Reed Science Field Guide series covering one of the commonest types of sea shore animals, the barnacles. The 32 page book provides a key to the identification of the 14 species of barnacles found in New South Wales together with brief notes on the anatomy and larval stages and habits of barnacles. It includes 30 colour photos figuring all the species plus short descriptions and ecological notes on each species.

Even though the book is of value to the interested field collector, with a little more thought and minor improvements it could have been made easier to understand and of much broader use to Australian naturalists. My first criticism is that the book was written exclusively for N.S.W. littoral regions. However, many of the species occur in other states. It would have been extremely helpful to have had included either in the notes on individual species or as a list somewhere the known Australia-wide distribution for each species and whether each is common or rare in each state. My second criticism concerns the construction of the keys and the layout of the book. It is confusing on first leafing through the book to find descriptions and ecological notes to most of the species repeated verbatum in two different parts of the book and to realise that both major parts of the key can lead to 11 of the 14 species. However, use of the key in the field reveals it to be of practical value in the field identification of the various barnacle species.

As an inexpensive information source to the intertidal field naturalist this book is both attractive and good value.

BRIAN J. SMITH,
Senior Curator (Zoology),
National Museum of Victoria.

Wild Australia

by Douglas Dorward. Paintings and drawings by John Olsen. Published by William Collins (Aust.) Limited.

Seven stories of man and birds which formed the basis of the successful ABC/TV series are complemented by sensitive photographs, drawings and paintings.

Recommended price: $11.95

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The recommended price is $2.50 for each book.

Field Naturalist Club of Victoria

Reports on FNCV Activities

General Meeting
Monday, 12 June, 1978

The speakers were Ms. Alison Oates, Assistant Curator in Anthropology and Ms. Annette Seeman, Education Officer, both from the National Museum of Victoria. Ms. Oates described the problems associated with obtaining early food plant references. Most European observers had virtually no botanical knowledge and as a result plants were often incorrectly named. There was a general lack of information on aboriginal diet as most of the European explorers and settlers were more interested in recording their conflicts with the aborigines rather than their life styles.

Ms. Oates described some of the 465 edible plants recorded as being used by the Victorian aborigines, which provided food from their roots, tubers, bulbs, rhizomes, flowers, fruits and gum; also manna, lerp and the roots of plants from which water was obtained.

Ms. Seeman then gave a short talk on the loan kit being prepared for teachers and other interested groups involved in studying the history, biology, ecology, nutrition and geography of the aborigines. This includes slides which show the food plant and its habitat, pressed and bottled specimens, extracts from early journals.

Exhibits: Included many artifacts used in the collection of plant foods: grinding stones, a digging stick, and a coiled reed basket. A range of plants used for food included specimens of the flower cones of *Banksia ornata* and *B. marginata* and roots of *Clematis microphylla*, fruits of *Exocarpus sparteus* and *E. aphyllus*, Native Cherries, *Enchylaena tomentosa*, Ruby Saltbush, *Solanum esuriale*, Quena and the Lilly Pilly, *Eugenia smithii*. Kernals of the Sweet Quandong *Santalum acuminatum*, tubers of the Bearded Greenhood, *Pterostylis barbata* and the Austral Hollyhock, *Lavatera plebeia*, seeds of *Atriplex stipitata*, the Kidney Saltbush, pods of the Eumong wattle, *Acacia stenophylla* and the fungus known as Black fellows bread, *Polyporus mylittae*; also a specimen of the gum of *Acacia decurrens*, the Black Wattle tree.

Mr. Ros Garnet displayed a copper billy which had been donated to the Club in 1950 by a Wonthaggi member to be used on Club camps. Other exhibits included an incomplete set of Broinowski's "Birds of Australia" and Paddy melons from Albury of which the Sulphur Crested Cockatoo is the only known avian predator; also sections of Red gum limbs, the bolls of which had been colonized by ants.

Copper billy
Photograph by E. Rotherham

General Meeting
Monday, 10 July, 1978

The President (Dr. Brian Smith) announced the death of Mr. Fred Morley, who had received his honorary life membership last year, and members observed a minute's silence.

Speaker for the evening was Mr. John Blythe, Survey Officer for the National Museum of Victoria, who spoke on "Aquatic Invertebrate Surveys — Aims and Methods".

Mr. Blythe's work involves the identification of aquatic invertebrates and their habits; making environmental and pollution assessments of waters, and ultimately protecting the natural systems. Through a series of slides, Mr. Blythe described collecting techniques used to sample both the adult and larval specimens, including the use of dip nets, kick samplers, drift nets and light traps. Some of the areas studied in the survey were the Thompson, Mitta Mitta, Latrobe Rivers and Kerang Lakes.

Exhibits. Included several types of collecting nets used by the Museum's aquatic invertebrate survey team, also a pot of Nodding Greenhoods, *Pterostylis nutans*, once very common in the Black Rock area, a specimen of *Eucalyptus crenulata*, the Buxton gum, once uncommon but now a popular garden plant because of its use to bees and honeyeaters.

Other exhibits included a facsimile of Batman's "Melbourne" Deed in the La-Trobe Library which was used by Mr. Fawkner to purchase Melbourne from the aborigines; galls on a lightwood wattle, *Acacia reflexa*; and a snail shell from England, a descendent of the snail that the Romans brought to England 2000 years ago, and still used as food today.

Also exhibited was a vegetable growth from the base of a jacaranda tree, some unidentified seats and a creeper with lantern-like pods from Sydney.

Amy Fuller. On display were six water colour paintings by Amy Fuller, of Eucalyptus *torquata, E. pyriformis, Hypocalimma robusta, Kennedia coccinea* and *Scaevola ramosissima*.

Miss Fuller, who died in 1944 bequeathed 230 water colour studies of native Australian and South African flowers to the Club which are among its most valued assets.

See Vic. Nat. Vol. 32, p. 57 and Vol. 74, pp. 147-150, for accounts of her life and work.

(Continued from page 126)

GROUP MEETINGS

All FNCV members are invited to attend any Group Meeting; no extra payment.

At the National Herbarium, The Domain, South Yarra at 8.00 p.m.

First Wednesday in the Month—Geology Group

Wednesday, 6 September. "Earth Science – what is it?" Ms Gabi Rosos, member VUSEB, Earth Science Board.

Wednesday, 4 October. "Mining costs today — feasibility". Mr Graeme Love.

Wednesday, 1 November. "Underwater mining of Manganese modules". Mr K. Han of Monash University.

Wednesday, 6 December. Members' Christmas party.

Third Wednesday in the Month—Microscopy Group

Wednesday, 16 August. Zoological and botanical section cutting, staining, mounting. ¼ hour members' exhibits.

Wednesday, 20 September. Special forms of transmitted light; demonstration of Kohler illumination, phase contrast, polarised light for biological specimens and interference. ¼ hour members' exhibits.

Wednesday, 18 October. Photography through the microscope — black and white, colour, movies. ½ hour members' colour slides.

Second Thursday in the Month—Botany Group

Thursday, 14 September. Slides of Queensland trip and members' night.

Thursday, 12 October. "Family Ranunculaceae". Miss Madge Lester.

At the Conference Room, The Museum, Melbourne at 8.00 p.m.
Good parking area—enter from Latrobe Street

First Monday in the Month—Marine Biology and Entomology Group

Monday, 4 September. "Leaf-eating beetles". Mr P. Kelly.

Monday, 2 October. Members' Night.

At the Arthur Rylah Institute, Brown St., Heidelberg at 8.00 p.m.

First Thursday in the Month—Mammal Survey Group

Monday, 7 September; Monday, 5 October.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions

Botany Group

Saturday, 26 August. Mornington Peninsula. Leader Mr Tom Sault.

Thursday, 28 September—/Sunday, 1 October. 4-day trip to Benalla. Members of Benalla FNC will help us, and we are invited to attend their meeting on Friday evening and Saturday excursion to Mt Wombat Reserve.

Saturday, 28 October. Gisborne to Bacchus Marsh. Leader Mrs Hilary Weatherhead.

Day Group—Third Thursday in the month

Thursday, 17 August. Botanic Gardens lakes area. Meet at corner of Park Street and Domain Road at 11.30 a.m.

Thursday, 21 September. Monash University grounds. Meet at head of the bus loop in the University grounds at 11.30 a.m. Valewood bus from Oakleigh station (north side) or from Chadstone Shopping Centre will take you into the grounds.

Geology Group

Excursions of the Geology Group will be announced at Group meeting.

WEEKEND CAMPS—Mammal Survey Group

19-20 August. Big River.

10-17 September. Eildon—Jerusalem Creek area.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora

Members include beginners as well as experienced naturalists

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

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the
victorian naturalist

Vol. 95, No. 5 September/October, 1978

F.N.C.V.

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
in which is incorporated the Microscopical Society of Victoria

$1·20

Registered for posting as a publication – Category "B"

FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra

Monday, 9 October, 8.00 p.m.

Speaker: Dr T. Rich, Curator of Vertebrate Fossils, National Museum of Victoria.
Subject: Some Australian vertebrate fossils. Honorary Membership to be presented to Mr Cedric Ralph.

Monday, 13 November, 7.55 p.m.

Extraordinary General Meeting. Business: Election of the Native Fauna Conservation Society as an affiliated club.

Monday, 13 November, 8.00 p.m.

Presentation of 1978 Australian Natural History Medallion to Mr Alan Sefton.
Speaker: The Medallion winner.
Subject: Effects of Industrial Development on the Natural History of Wollongong.
Honorary Membership to be presented to Mr Alfred A. Baker.

Monday, 11 December, 8.00 p.m.

Speaker: Dr J. Nelson, Senior Lecturer in Zoology, Monash University.
Subject: Arnhem Land mammals.
Honorary membership to be presented to Mr Colin F. Lewis.

New Members — October General Meeting

Ordinary:

Ms Gail Lawrence, Dept. of Botany, Latrobe University, 3052. Botany.
Miss A. A. Pennell, 5/11 Selwyn Ave., Elwood, 3184. Geology and botany.
Miss J. Stevenson, 3/14 Wrexham Rd., Windsor, 3181

Joint:

Mr Frank May & Mrs L. May, c/- Forests Commission, Kallista, 3791.
Ms Helen Arundel & Mr Brian Arundel, 59 Illawarra Rd., East Hawthorn, 3123. Birds & mammals.

Country:

Mr J. Sexton, P.O. Box 203, Seymour, 3660.

FNCV EXCURSIONS

Saturday, 14 October — Friday, 20 October. Grampians and Little Desert. The coach will leave Flinders Street from outside the Gas and Fuel Corporation at 8.15 a.m., bring a picnic lunch. Accommodation will be at the Central Motel, Ararat, Saturday & Sunday; Innkeepers Westlander Motel, Horsham, Monday; and Little Desert Lodge, Nhill, Tuesday, Wednesday and Thursday; all accommodation on a dinner, bed and breakfast basis. The coach will return to Melbourne on Friday.

As the above excursion includes the third Sunday, there will not be a general day excursion in October.

Tuesday, 7 November (Cup Day). Bushrangers' Bay, to be led by the President, Dr Brian Smith. The coach will leave Batman Avenue at 9 a.m., fare $5, junior half price. Bring two meals. A special invitation is extended to juniors.

Sunday, 19 November. Labertouche. The coach will leave Batman Avenue at 9.30 a.m., fare $5.50. Bring two meals.

Saturday, 30 December — Sunday 7 January. Bundanoon, N.S.W. The party will stay at the Bundanoon Hotel on a dinner, bed and breakfast basis. Transport will be by tram, leaving Melbourne at 8.40 a.m. on the "Daylight" and returning on the "Spirit", leaving Bundanoon at 10.35 p.m., Saturday and arriving in Melbourne at 9.55 a.m. Sunday. Accommodation and first class return rail will be approximately $200. It is proposed to charter a bus for day trips and this cost will be extra. A deposit of $25 should be paid when booking and the balance by the end of November. Sleepers on the return journey cost $8 extra and members wanting one should notify the excursion secretary promptly as they may be hard to obtain.

(Continued on page 211)

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Cover illustration: Left to right *Caladonia patersonii* and *Diuris punctata*. Photographed by E. Rotherham from the paintings by Amy Fuller.

Sandy Beaches

By A. W. Beasley*

Sandy beaches along our coast are popular playgrounds. As well as being recreational assets, some beaches are of economic value for the minerals they contain. It is interesting to consider the nature, composition, and origin of sandy beaches.

Beaches are defined as accumulations of loose sediment deposited by waves and currents in the shore zone. This is the zone between the water's edge at normal low tide and the landward limit of effective wave action; it extends above normal high tide level, and is inundated by exceptionally high tides and by large waves during storms. Most beaches on the coast of Australia are sandy, but some are composed of pebbles, cobbles and boulders. The beach sand may have had several different sources. It may have been washed up by waves from the sea floor. It may have been derived comparatively recently from the erosion and disintegration of rocks exposed in coastal cliffs. Some may have come from nearby rivers which carried down sandy loads to the coast, mainly in times of flood.

Sandy beaches are seen to be built up during calm weather when waves are driven by gentle winds and tend to have a long wave length. On the other hand, sandy beaches are seen to be combed down, and much or all of the sand may be removed by waves generated by strong winds, especially storm waves, which have a short wave length.

Along much of the Australian coast the dominant wave direction is oblique to the shoreline. Sand is carried obliquely up the beach by the swash of a breaking wave, but the backwash carries it back at right angles to the shoreline, following the steepest gradient. The resulting action is that sand and other beach material is carried sideways in a zig-zag motion. This process by which material is transported along the shore is known as longshore drift. Longshore drift and the immediate coastal rocks largely control the character of beach deposits. Sand may be moved considerable distances along the beach by longshore drifting. Drift action also takes place within the breaker zone and extends to the lower limit of wave action offshore; this drifting of sand along the sea floor parallel to the shore is produced by wave-induced currents. The overall direction of drift is determined by the strength and duration of winds, the sand travelling in the direction of the prevailing winds. Thus, along much of the Victorian coast the predominant drift is from west to east under the influence of wind-driven waves generated by prevailing south-westerly winds.

Large tracts of the Australian coast, particularly in eastern Australia, consist of long sandy beaches separated by cliffed headlands. Wave energy is concentrated on headlands, and dispersed in bays with the result that shorelines tend to be made smooth in plan.

During Quaternary (Pleistocene and Recent) times, that is during the last two million years, great quantities of sandy beach material have accumulated along our coast. Rivers that were far larger and more powerful than those which now flow into the sea brought down much material to the margin of the sea in Pleistocene (Ice Age) times. With changes of sea level in Quaternary times a considerable amount of sand has passed through the surf or breaker zone a number of times and been reworked by wave action.

Much of the sand composing beaches along the Victorian coast has been brought to the shore comparatively recently from the sea floor close offshore by wave action. At some places it is apparent that erosion and disintegration of rocks exposed in coastal

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National Museum of Victoria.

Fig. 1. Sandy beach near Sorrento, Victoria, derived mainly from the erosion of adjacent cliffs of aeolianite.

outcrops has yielded much of the material composing the beach sand. For example, cliffs and shore platforms of calcareous aeolianite on the Nepean Peninsula in Victoria have been important contributors of material which has gone to make up the sandy beaches of that region. Similarly, the sandy beach at Mornington in Port Phillip Bay has apparently resulted largely from the erosion of cliffs of sandstone along the coast there.

Sandy beaches are often flanked by a belt of dunes. When dry, the sand grains are picked up particularly from the backshore zone of the beach, above normal high tide level, by onshore winds and carried a short distance inland where they are trapped by vegetation or moister ground. Erosion of the foredune adjacent to the beach occurs intermittently at many places. Prolonged attack by powerful waves generated during storms and cyclonic disturbances may remove considerable amounts of sand from the foredune as well as the beach. Much of this sand is carried into fairly deep water offshore and it may be a long time before it is brought back to the shore.

Sandy beaches generally have a low angle of slope. Where the shore gradient is very small, the foreshore is wide. This is the zone exposed at low tide but submerged at high tide. A wide foreshore is present, for example, at Rosebud and Rye in Port Phillip Bay.

Most sandy beaches are composed mainly of quartz grains and shell particles. Certain beaches, such as Squeaky Beach on Wilsons Promontory, are composed almost entirely of quartz grains. On the other hand, beach sands at Portland in western Victoria consist chiefly of shell particles, with only a few percent of quartz grains and other constituents. In Victoria, the beach sands east of Wilsons Promontory are predominantly quartzose, while west of Wilsons Promontory the sands of the ocean beaches are characteristically calcareous, being composed largely of shell fragments.

Quartz is a common rock-forming mineral which is very durable; this is why it is so abundant in sandy beaches. Frequently the

Fig. 2. Seams of heavy mineral beach sand (black sand) near Broadbeach, Queensland.

quartz and other mineral grains in beach sands have had a long detrital history since they were released by weathering and disintegration of source rocks. The primary source of most of the quartz in beach sands is granite, in which it generally occurs as sand-size grains. However, in many places the immediate source rocks are sandstones derived from the weathering of granites and other rocks.

In Victoria, a large amount of the shell material in ocean beach sands west of Wilsons Promontory has come from the weathering of coastal rock outcrops of calcareous aeolianite, which is composed largely of shell particles of sand size. Cliffs and shore platforms of aeolianite are prominent coastal features at such places as the Nepean Peninsula and further to the west at Warrnambool and Portland. This rock was formed from shell-rich sand blown from the exposed sea floor into high dunes at times of low sea level in Pleistocene times. Lime was spread through these calcareous sand dunes and they became lithified to form the aeolianite, sometimes called dune-limestone or aeolian calcarenite.

The shell material in most sandy beaches

in Australia and elsewhere has been derived from the skeletons of marine organisms which lived on the sea floor and on rocky shore platforms. Many of the shells were broken into fragments, particularly after the animal died, by the pounding of waves. Shell material of fairly recent origin is found washed up in abundance on the shore at various places in Port Phillip Bay and Westernport Bay; it plays an important part in building up sandy beaches.

As well as quartz, grains of other minerals are generally present in beach sands. These may include mica and feldspar as well as so-called heavy minerals such as ilmenite, zircon, rutile, tourmaline and garnet. These heavy minerals have specific gravities markedly higher than quartz and shell material. At some places heavy minerals are relatively abundant in sandy beaches. Under such conditions wave action concentrates them into layers and, since most of the minerals are dark coloured, such concentrations are known as black sand deposits. These heavy mineral deposits occur in the backshore zone where powerful waves have carried the heavy mineral particles far up the beach and the backwash has dragged back most of the quartz and other light constituents. Following storms or cyclonic gales the backshore zone is sometimes covered with a layer of heavy minerals; digging down in the sand may reveal a number of well-defined seams of heavy mineral concentrates. Such deposits have been exploited for their zircon, rutile and ilmenite content in Queensland, New South Wales and Western Australia. Ilmenite and rutile are sources of the metal titanium, and zircon is the main source of zirconium.

By definition, sand grains range from 1/16mm to 2mm in diameter. In many beaches the grains are well sorted, that is they are mostly within a certain narrow range of size, and the grains often have a high degree of roundness. Walking on the dry sand of some beaches causes a squeaking or musical sound to be produced. Sands which possess this property are called "singing sands". The property has given Squeaky Beach on Wilsons Promontory its name. It is considered that the sound emitted when the dry sand is struck by the foot at Squeaky Beach and other places is connected with the nature of packing of the grains, which is controlled by their narrow range of size and their shape. At Squeaky Beach most of the sand grains are subrounded to rounded and they have a fairly high degree of sphericity. Presumably, the pressure produced when the sand is disturbed results in shearing, successive layers of the regularly packed grains shifting over the other grains. The character of the musical note produced is some function of friction.

Back issues of Victorian Naturalist for Sale

Mr. J. Rouel, PO Box 39 Point Lonsdale has several issues of the "Victorian Naturalist" Vols 86 to 91 inclusive which he will sell cheaply.

Methods for Marking Individual Snake-necked Tortoises *Chelodina longicollis*

BY W. J. M. VESTJENS*

Abstract

Methods of marking tortoises individually are described. Marking by cutting the marginal shields was found to last at least 20 years.

Introduction

The long-necked tortoise *Chelodina longicollis*, has been studied at Canberra, A.C.T. (Vestjens, 1969). This paper reports the results of testing several methods for individual marking of the tortoises.

Methods and Results

The observations began in 1956. Tortoises were collected in two permanent large ponds at and near "Gungahlin" Canberra, A.C.T. After being marked they were returned to the respective ponds from which they had been collected.

The following marking methods were tested:

(a) **Claw clipping**

Claws on the front and hind feet were cut with bone cutters.

This technique was discontinued because some tortoises when first collected already had claws missing.

(b) **Painting the carapace**

The carapace was scrubbed with a hard brush to remove dirt and algae. The tortoises were held in a cage until the carapace was completely dry. A number was then painted boldly on each side of the carapace. House paint was used, and the colour denoted the particular pond from which the tortoise was collected. After the paint had dried the animal was returned to its pond.

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The method was discontinued after some months when it was found that the marking was not permanent because of moulting of the shields.

In addition, the application of paint to the shields may upset the temperature control of the tortoise and may also cause deformity (Roberts, 1955).

(c) **Marking with reflective tape**

Symbols cut from strips of "Scotchlite" self-adhesive refelective tape were stuck onto the carapace after it had been cleaned and dried. This method was unsuitable because of moulting of the carapace shields.

(d) **Cutting the marginal shields**

In 1957 tortoises were marked by cutting small V-shaped notches in the marginal shields of the carapace (see Fig. 1a). The marginal shields do not cover internal organs as the vertebral and costal plates do. It was found that the number of marginal shields was constant in all collected tortoises; the number of vertebral and costal shields varied.

For tortoises with a carapace length of less than 100 mm a scalpel was used to cut the notches. Each notch was 2 mm wide at the opening and 2 mm deep.

For animals longer than 100 mm a hacksaw blade was used. Generally the notch was 3 mm wide at the opening and 5 mm deep. In the case of shields numbered 5, 6, 7, 50, 60, and 70 in Fig. 1b the notch was made not deeper than 2 mm since these shields are connected to the plastron.

The key for the numbering of individual tortoises is shown in Fig. 1b. Animals marked by this method may have one to three V-shaped notches. For example number 5 will have one cut; number 55 two

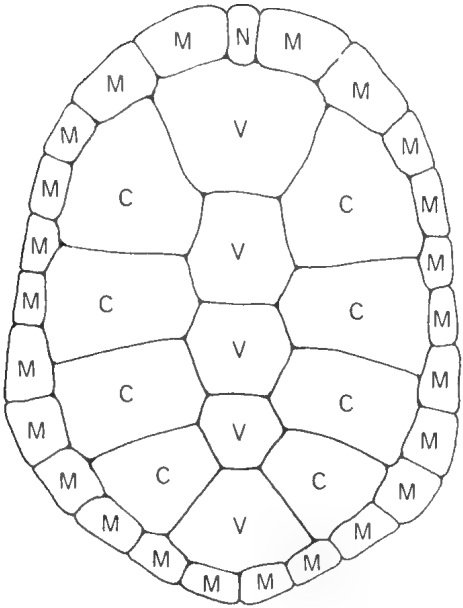

Fig. 1 (a). Carapace with names of shields: C = costal; N = nuchal; M = marginal; V = vertebral.

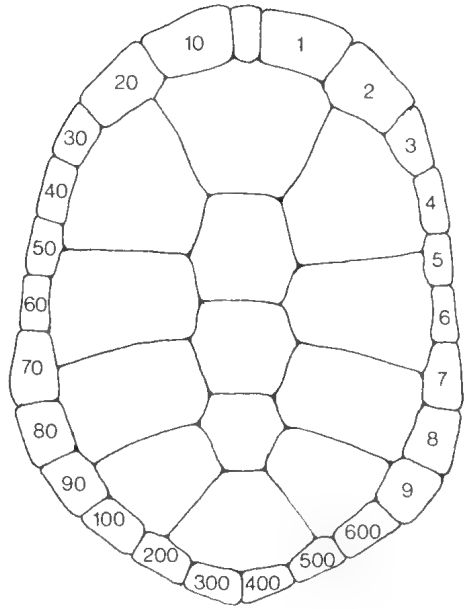

Fig. 1 (b). Key to marginal marking of individual tortoises from 1 to 699.

cuts (50 + 5); number 555 three cuts (500, 50 and 5). Using this system 699 may be individually marked and an extra 100 if the nuchal shield is also included.

Animals which were marked with the V-shaped cut were retrapped several years after marking. The V-shape had changed slightly to a U-shape.

From 1957 to 1977, 73 tortoises marked by this method were retrapped; 22 had been marked more than 10 years. One animal, number 13, was marked in February 1957 and retrapped in August 1977; after more than 20 years the marking was clearly visible.

Conclusion

The marking of individual tortoises by V-shaped notches in the marginal shields has been found to be effective for at least 20 years after marking. This method would be suitable for long-term studies on development and movement in several species of tortoises.

The only disadvantage is that the animals have to be trapped and handled in order to be identified.

Acknowledgement

The author is indebted to Mr. B. V. Fennessy for helpful discussion and for reading the manuscript and to Mr. F. Knight for drawing the figure.

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Vestjens, W. J. M., 1969. Nesting, egg-laying and hatching of the snake-necked tortoise at Canberra, A.C.T. *Aust. Zoologist* **15**, 149-9.

Five Small Fungi Newly Recorded from Victoria, Australia

BY G. BEATON* AND G. WESTE†

Five small fungi, not previously recorded for Victoria, have been described and illustrated. These are all discomycetes, that is fungi in which the spores are exposed at maturity. The fruiting body which bears the sporangia is often called an apothecium, and is usually cup-shaped. However in one of the five small fungi described here (Microglossum) the fruiting body is compressed and spear-shaped rather than cup-shaped. Three of the fungi were collected from native forest and streams, while the remaining two were found on the lower surface of leaves from introduced trees.

Microglossum viride (Pers. ex Fr.) Gill was collected from dense rain forest in eastern Victoria. *Vibrissea guernisaci* Crouan, the first sessile species of Vibrissea (section Apostemium) to be recorded for Victoria, was collected from under a small waterfall in the Otways. *Polydesmia pruinosa* (Berk. & Br.) Bond. was found on each occasion in association with a pyrenomycete on eucalypt bark.

These fungi are not common, but their descriptions and illustrations may stimulate others to find them. The macroscopic drawings (E in the figures) illustrate clearly the nature and size of these unusual fungi.

Microglossum viride (Pers. ex Fr.) Gill. *Disc. Champ. Fr.*: 25. 1879.

Geoglossum viride Pers. ex Fr. *Syst. Mycol.* 1: 489. 1821.

(Fig. 1.)

Ascocarp solitary, clavate, to 3 cm high; fertile portion 1.5 x 0.6 cm, slightly compressed, longitudinally furrowed, sharply delimited from stalk, dark green when fresh becoming greyish-brown after a long immersion in F.A.A.; stalk cylindrical, flexuose, slightly flattened apically, 15 x 2 mm, pale green when fresh, becoming greyish-orange in F.A.A., appearing smooth but with a few scattered squamules visible under lens; flesh of fertile portion of hyaline or lightly pigmented parallel hyphae with some inflated cells and restricted septa, passing into the medulla of the stalk where the hyphae become thinner and shorter celled; the thin hyphae of the stalk cortex more tightly bound and heavily pigmented and surmounted by a few strands of more irregular hyphae that form the scattered squamules. *Asci* clavate, 8-spored, 85-100 x 8-10 μm, positive iodine reaction. *Ascospores* broadly elliptic-fusiform, obliquely uniseriate, with 2 or 3 large oil drops, hyaline, 12-19 x 5.5-6.5 μm, smooth, at first continuous but after a long period appearing 1-2-pseudo-septate. *Paraphyses* filiform, branched from the lower third, about 1 μm thick expanding to 2.5 μm at the tips, mostly of same average length as the asci, a few to 10 μm longer.

Known in Victoria from a solitary ascocarp, Mt. Drummer jungle gully, eastern Victoria, on a wet patch beside stream, *G. Beaton 188*, 20 May, 1964.

Assigned to *M. viride* more on the green coloration of the ascocarp than on microscopic dimensions. In ascus size it is closer to *M. olivaceum* (Pers. ex Fr.) Gill. than to *M. viride* (see Dennis, 1968, Mains, 1946 and Seaver, 1951) and the ascospore size does not seem to be significantly different from either. Also the degree of roughness or smoothness of the stalk does not seem to be a reliable character. At no stage have truly septate ascospores been observed. In phloxine mounts made from the fresh specimen the ascospores were 2-3-guttulate, a condition they maintain after thirteen years. In mounts recently made after the ascocarp had been for thirteen years in F.A.A. the ascospore appearance is similar except that the cytoplasm between the

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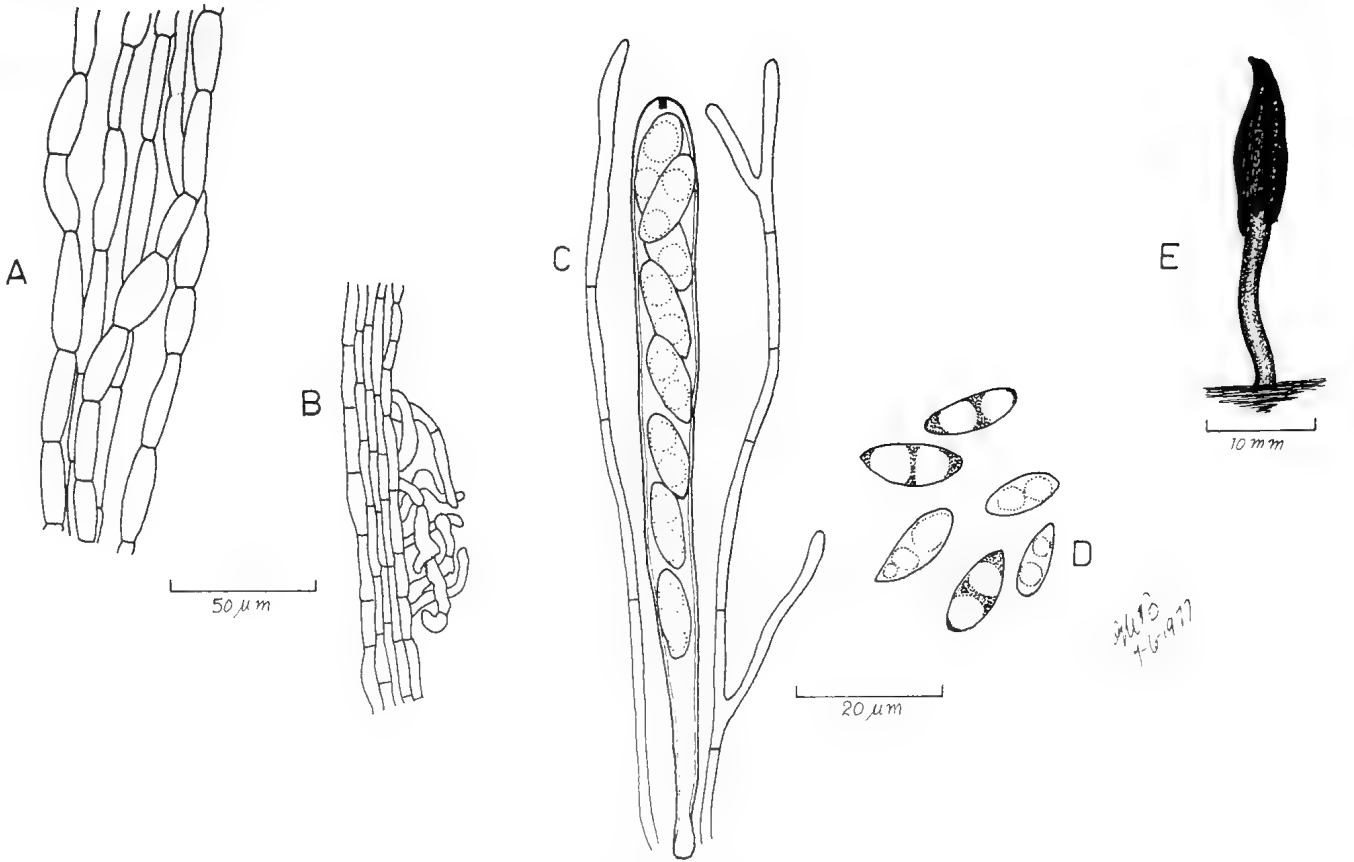

Fig. 1. *Microglossum viride*. A. Hyphae from medulla of fertile head, B. Hyphae of stalk cortex with squamule, C. Ascus and paraphyses, D. Ascospores, three shaded to show pseudo-septation, E. Ascocarp.

guttules has become granular in appearance. With careful examination under oil immersion it is clear that this granular condition could not be interpreted as true septa. This appears to contradict the description given by Dennis (1968) and by Seaver (1951) who both gave the ascospores as multi-septate, a condition that, apparently, was not observed by Mains (1946).

The fungus must be more plentiful, at least in eastern Victoria, than the solitary ascocarp would indicate. It is hoped that more adequate collections will be made in the near future.

Vibrissea guernisaci Crouan *Annls. Sci. Nat. Bot.* ser. 4, 7: 176, 1857. (Fig. 2.).
Apostemidium guernisaci (Crouan) Boud. *Hist. Class. Discom. d'Europe*: 91 (1907).

Apothecia superficial, scattered; disk to 1.5 mm diameter, grey-white with white areas of extruded ascospores. Convex and standing slightly above the black margin when fresh or soaked, black and depressed when dry; receptable saucer-shaped, sessile, with a broad central attachment, black, slightly roughened under hand lens; ectal excipulum to 130 μm thick in the basal area, a pigmented, irregular textura prismatica with cells to about 30 x 15 μm lying at a high angle to the surface and merging into two or three superficial layers of darker, thicker walled, globose, ellipsoidal or irregularly shaped cells; medullary excipulum hyaline, dense, structure not clearly seen. *Asci* cylindrical with a long, tapering stalk, with eight spores in a fascicle, 210-250 x 6.5 μm no iodine reaction. *Ascospores* filiform, tapering downwards, approx. 130-170 x 1.5 μm, hyaline, septate, averaging about 15 μm between septa. *Paraphyses* cylindrical with clavate tips, about 30 μm longer than the asci, some branched and septate in upper third, 1.5 μm thick, tips to 6 μm.

Collection examined: Quarry Glen, Turton's Track, Otway Range, Victoria, on fallen eucalypt branch under small waterfall. *G. Beaton 276*, 14 Feb., 1965.

This Victorian collection is, as far as is known, the first *Vibrissea*, section Apostemium (Sanchez & Korf, 1966) that has been recorded from the area. It compares most closely with *V. guernisaci* Crouan but differs in some dimensions and in the distribution of pigmentation in the ectal excipulum from the description of Graddon (1965) and in the colour of the apothecium from that of Seaver (1951). However, the range of ascus size of the Victorian collection is well within the limits assigned to *V. guernisaci* by Graddon and Seaver, and the degree of pigmentation of the ectal excipulum seems to be too variable a factor to have great significance. The ascospore length, deduced from the measurement of numerous ascospore fascicles falls slightly below the range given by Graddon but, again, this seems hardly significant as ascospore length, when it can be measured accurately, is variable within each species. *V. guernisaci* is the only species that we can locate in the literature that has a black receptacle and this, coupled with a broad agreement in dimensions and apothecial structure, leads us to believe that the Victorian fungus is best identified with *V. guernisaci*.

Key to Victorian Species of Vibrissea

1. Apothecia sessile *V. guernisaci*
1. Apothecia stipitate
2. Ascomata with green pigmentation in stem or head or both when fresh. 3
2. Ascomata lacking green pigmentation, being brown or yellowish brown when fresh or dried, toughly gelatinous when fresh. *V. dura*
3. *Whole ascoma dark green, releasing dark green pigment in 2%* KOH solution, tips of paraphyses up to 7 μm wide. *V. melanochlora*
3. Green pigmentation much less intense or limited to the ascoma stem, tips of paraphyses less than 4 μm wide. 4
4. Whole ascoma pale green when fresh, drying at least partially brown, stem hairs to 150 μm, asci mostly less than 125 μm (Tasmania). *V. tasmanica*
4. Green pigment restricted to ascoma stem when fresh, head yellow, drying to grey black, stem hairs mostly less than 50 μm, asci to 155 μm. *V. bicolor*

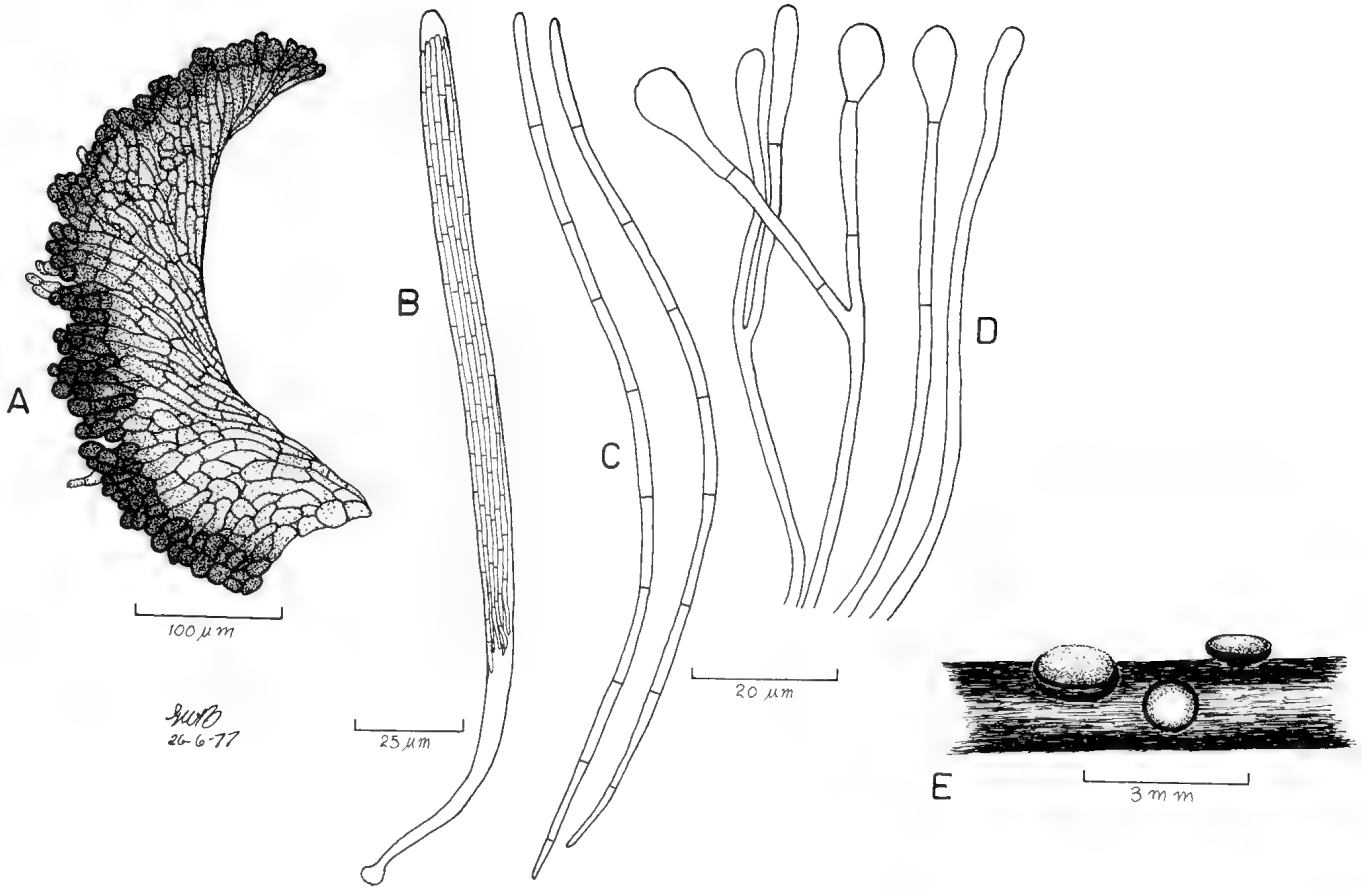

Fig. 2. *Vibrissea guernisaci*. A. Ectal excipulum, B. Ascus, C. Tips of paraphyses, D. Ascospores, E. Apothecia.

Polydesmia pruinosa (Berk. & Br.) Bound., *Hist. Class Discom. d'Europe*: 100 (1907). (Fig. 3.)

Apothecia superficial, scattered; disk to 0.6 mm diameter, flat or slightly convex, pruinose with protruding tips of paraphyses, white when fresh or dry; receptacle sessile, saucer-shaped, white, downy, margin inconspicuous; ectal excipulum of varying thickness, a rather thick-walled textura angularis to textura epidermoidea with cells becoming smaller towards the surface and mixed with irregular strands of hyphae with shortly protruding ends. *Asci* cylindrical-clavate, slightly curved, 8-spored, pore strongly iodine positive, 80-100 x 6.5-10 μm. *Ascospores* ellipsoidal-fusiform, straight or curved, hyaline, smooth, irregularly distributed in the ascus, containing several oil drops, at first continuous, becoming 1-3-septate, 13-27 x 3.5-5 μm. *Paraphyses* filiform with irregular, much-branched tips, slightly longer than the asci, about 1.5 μm thick.

Fruiting at various times throughout the year on or associated with stromatic Pyrenomycetes.

We are indebted to Dr. Derek Reid for drawing our attention to the presence of *Polydesmia* in the Victorian area. The agreement of Victorian collections with the description given by Dennis (1968) is good. The upper range of ascospore size is greater than that given for European collections but the larger spores are only a very small proportion of the total. The protruding ends of the ectal excipulum hyphae are not as prominent as is indicated by Dennis and we have also observed a thin layer of amorphous material on the surface that seems to fragment and probably adds to the downy appearance of the receptacle.

Collections examined: Cumberland Reserve near Marysville, Victoria, on bark of living *Eucalyptus regnans* F. Muell., on a dead Pyrenomycete, *D. Reid* (herb. Beaton 388), 19 Jun. 1976; Laver's Hill, Victoria, on dead Pyrenomycete on fallen eucalyptus branch, *G. Beaton 116*, 17 November, 1963; Mait's Rest near Apollo Bay, Victoria, associated with Pyrenomycete inside fallen bark of *E. regnans*, *G. Beaton 388a*, 23 July, 1976.

Trochila ilicina (Nees ex Fr.) Greenhalgh & Morgan-Jones *Trans. Br. mycol. Soc.* **47** (2): 311-320 (1964). (Fig. 4.)

Sphaeria ilicina Nees ex Fr. *Syst. Mycol.* **2**: 1823.

Eustegia ilicis (Fr.) Chev., *Flor. Gen. Paris* **1**: 443, 1826.

T. ilicis (Chev.) Crouan, *Flore de Finistere* p44, 1867

T. ilicis (Chev.) Rehm. Die Pilze **3**: 129, 1896

Apothecia scattered or in swarms, sometimes confluent, immersed in the underside dead leaf tissue and opening by lifting the covering patch of host epidermis; disc to 0.8 mm diameter, circular, elliptical, or irregular if apothecia confluent, dark grey when soaked or fresh, drying almost black, flat or slightly convex and standing slightly above the epidermis; the hymenium arising almost directly from a layer mostly less than 35 μm thick of brown pigmented, thick walled textura globulosa to textura angularis which turns up around the disk and shows as a blackish margin through the epidermis; mycelium of thin-walled hyphae to 3.5 μm diameter, brown beneath the apothecium becoming hyaline in the host tissue; the slightly protruding disk is protected by a layer of paraphyses to about 50 μm thick that become shorter and modified towards the surface of the leaf. *Asci* clavate, 8-spored, 70-85 x 8-11 μm, positive iodine reaction. *Ascospores* obliquely biseriate, ellipsoidal, hyaline, smooth, with one or two large oil drops, a few becoming palely tinted with age, 10-12 x 4.5-5.5 μm, non-septate. *Paraphyses* clavate, septate, unbranched, up to about 15μm longer than the asci, 2.5 μm thick, tips to 5 μm.

On the underside of dead leaves of holly (*Ilex aquifolium* L.) in winter. Many holly trees have been examined throughout Victoria during the 13 years since the finding of the listed collection but no further evidence of the presence of *T. ilicina* has been found. There does not seem to be any

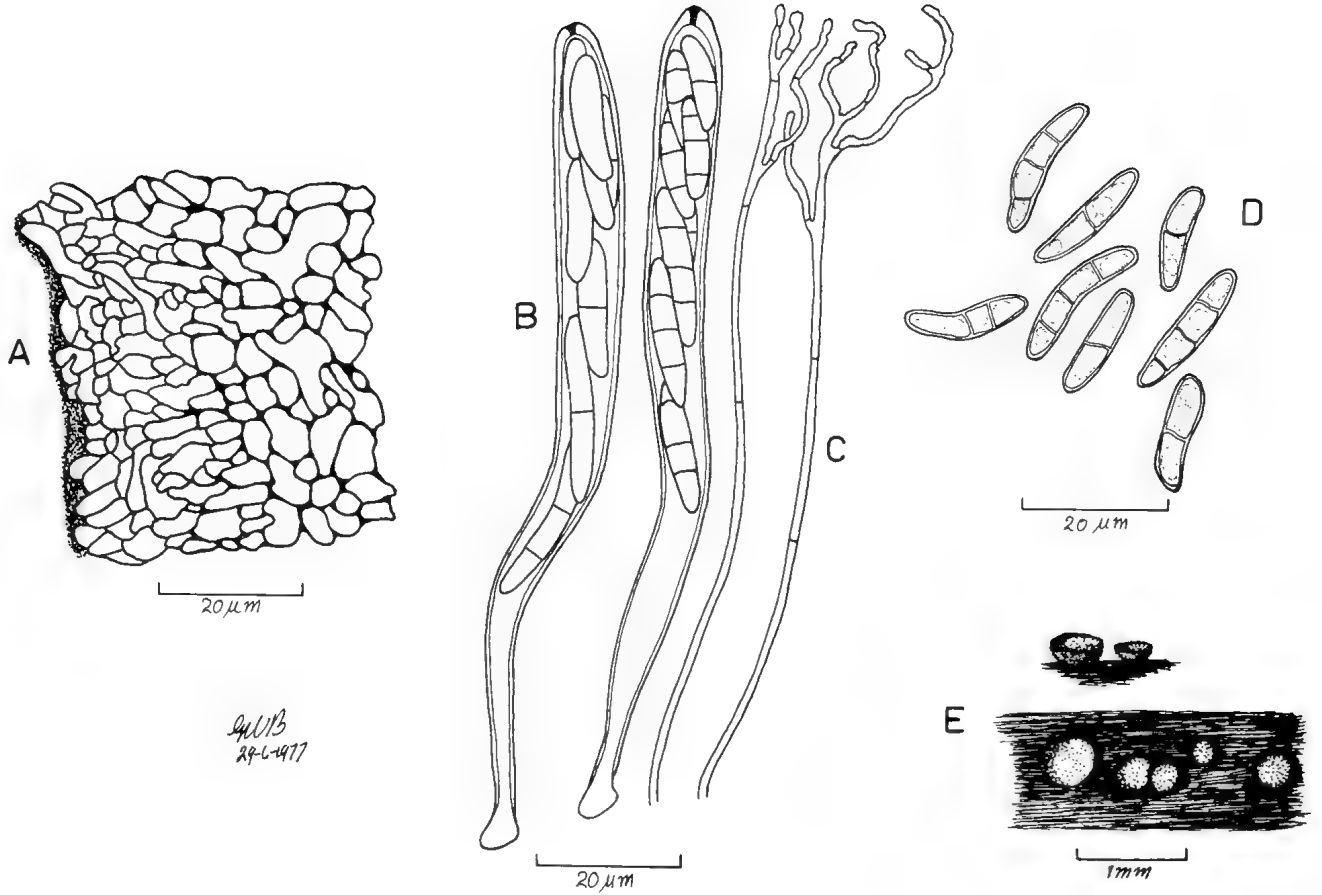

Fig. 3. *Polydesmia pruinosa*. A. Ectal excipulum, B. Asci, C. Paraphyses with much-branched tips, D. Ascospores, E. Apothecia.

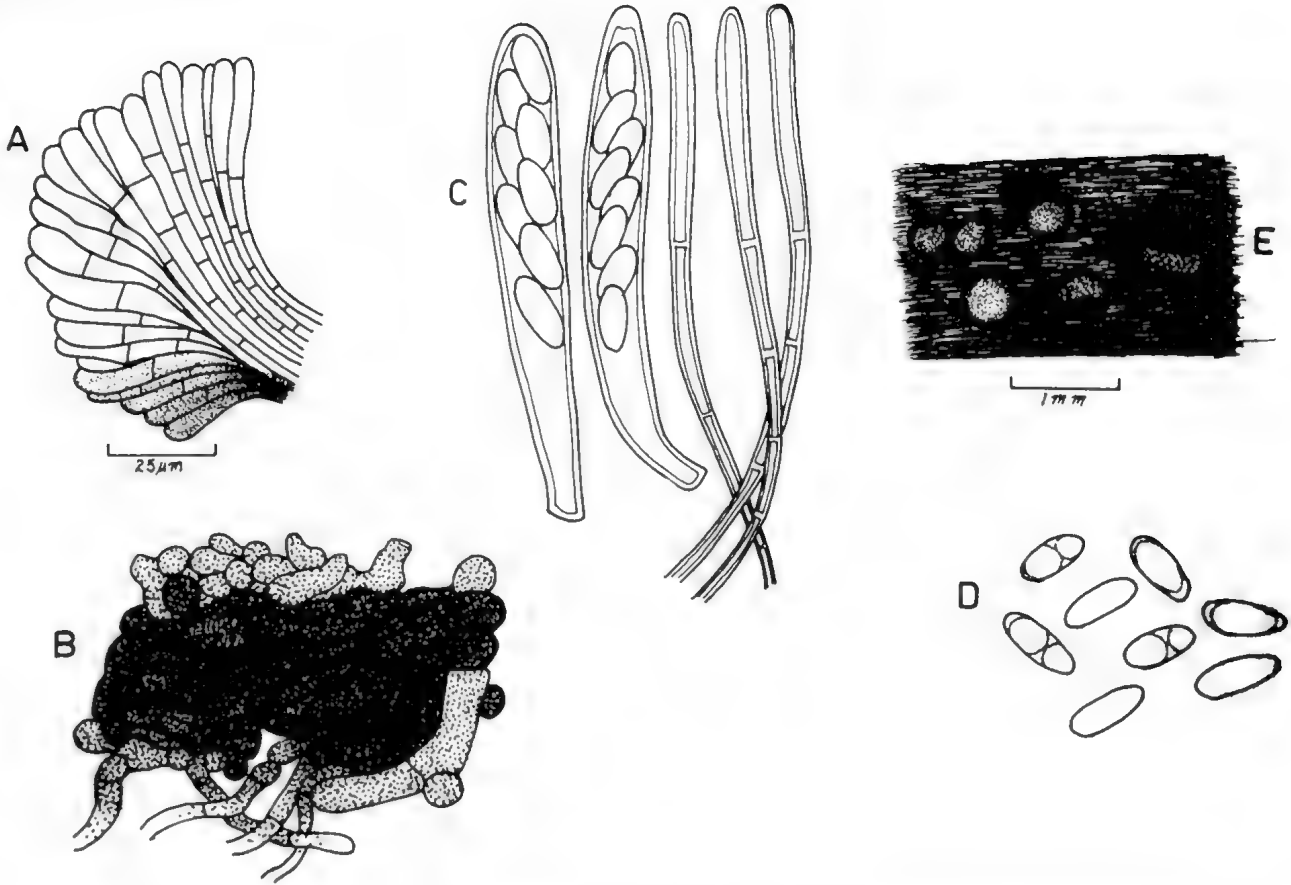

Fig. 4. *Trochila ilicina*. A. Marginal area, B. Basal pigmented cells and hyphae, C Asci, D. Ascopores and paraphyses, E. Apothecia.

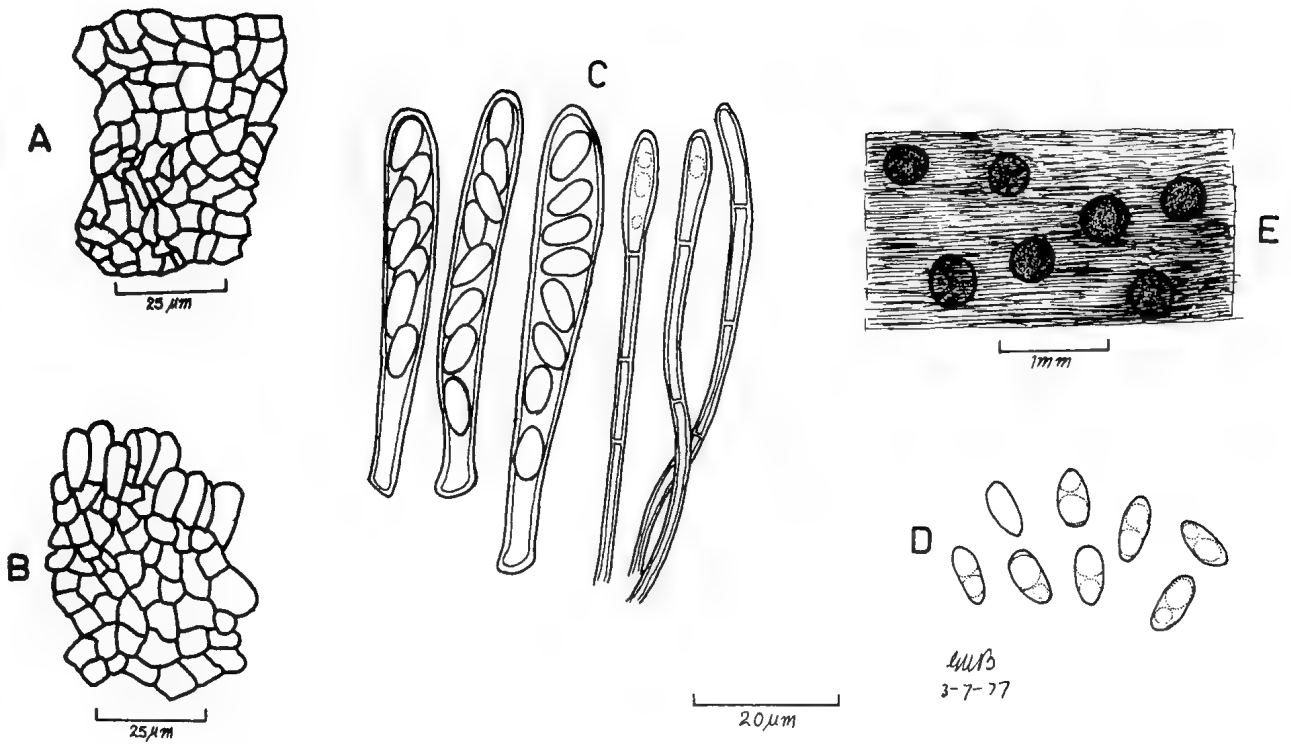

Fig. 5. *Trochila laurocerasi.* A. Basal cells of receptacle, B. Marginal area with elongated cells, C. Asci and paraphyses, D. Ascospores, E. Apothecia, three with epidermal lobes.

significant difference between the Victorian collection and the descriptions given by Dennis (1968) and Greenhalgh and Morgan-Jones (1964) and it is reasonable to assume its identity with the European species.

Collection examined: Devondale, Victoria, in deserted garden on heathland, *G. Beaton 289*, 13 June, 1965.

Trochila laurocerasi (Desm.) Fr. *Summa Veg. Scand. Sect. Post.*: 367 (1849). (Fig. 5.)

Apothecia scattered, seldom confluent, immersed in underside of leaf, exposed by the splitting and turning back in irregular lobes of the overlying epidermis; disc to 0.4 mm diameter, greenish-grey when fresh, dark grey when soaked, mostly covered by lobes of epidermis when dry, circular, flat; receptacle dark brown, saucer-shaped, forming a thin black-appearing margin which supports the hymenium slightly above the leaf surface in fresh or soaked apothecia; brown basal layer to about 40 μm thick, a pigmented, thick-walled textura angularis with cells becoming larger and more elongated in the upper marginal area; subhymenium to about 50 μm thick, of vertical, mostly parallel, thick-walled, hyaline hyphae. *Asci* clavate, 8-spored, strong positive iodine reaction, 55-65 x 6-9 (– 12) μm. *Ascospores* uniseriate or irregularly biseriate, ellipsoidal, hyaline, smooth, mostly with two large oil drops, 7-10 x 3.5-4 μm, non-septate. *Paraphyses* clavate, septate, unbranched, same length as asci, a few with greenish oil drops, 2.5 μm thick, tips to 4 μm.

These fungi were found fruiting in autumn on the underside of dead leaves of Cherry Laurel (*Prunus laurocerasus* L.). As with *T. ilicina*, known to us from a single Victorian collection which agrees very well with the description given by Greenhalgh & Morgan -Jones (1964) except that no brown ascospores were observed.

T. craterium Fr., an inconspicuous species on the dead leaves of Ivy (*Hedera helix*) with asci to 60 x 12 μm, ascospores 6-9 x 4-5 μm and paraphyses to 6 μm wide at the tips (Dennis 1968) should also be looked for in Victoria.

Collection examined: Blackwood near Ballan, Victoria, *B. Fuhrer* (herb. Beaton 329), 29 May, 1966.

Acknowledgements

The authors thank Dr. Swart for a critical reading of the manuscript and Dr. Calder, Chairman of the School of Botany for making facilities available.

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GLOSSARY

Apothecium: a fungus fruiting body with spores produced in asci on the exposed surface, often cup-shaped. When apothecia are confluent each one is linked to the next.

Amorphous: shapeless and without definte structure.

Ascocarp: the fruiting body bearing the asci.

Ascoma: a fruiting body producing sacs of spores.

Ascus: a sac-like bag in which spores are produced.

Ascospore: the spores produced inside the ascus.

Biseriate: in two layers, usually ascospores in an ascus in this paper.

Clavate: club-shaped.

Discomycete: a large group of fungi which produce their spores on an exposed surface, usually in apothecia, and often called the 'cup-fungi'.

Excipulum: the outer tissue of the apothecium. it is often denser and darker. Ectal excipulum refers to the outermost or superficial layers. Medullary excipulum refers to the layers inside the ectal excipulum.

F.A.A.: formalin acetic acid, fixative used to preserve the fungi.

guttulate: of spores containing one or more oil globules

hyaline: transparent.

hymenium: fertile layer which forms spores.
hypha: thread of fungus; the tissue of fungus consists of threads.
KOH: caustic potash.
paraphysis: sterile filaments or hairs which grow among the asci.
pyrenomycete: fungi with a flask-shaped fruiting body in which the asci lie parallel.
septum: cross wall.
Sessile: not stalked.
squamules: small scales.
textura angularis: short-celled tissue of polyhedral cells without air spaces in the fruiting body.
textura epidermoidea: long-celled tissue of hyphae running in all directions without intercellular spaces in the fruiting body.
textura prismatica: short-celled tissue of prismatic cells in the fruiting body.
textura globulosa: short-celled tissue of round cells with intercellular spaces in the fruiting body.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 141 in the previous issue)

BY JAMES A. BAINES

Pholidia. Gk pholis (genitive pholidos), a horny scale, particularly of reptiles. A superseded name for *Eremophila*.

Phragmites. Gk phragmites, of fences (from phragma, a fence or screen); from the way these large grasses form a hedgelike growth along ditches. There are only three species in the world, ours being the cosmopolitan *P. communis*, Common Reed, which forms floating fens at the mouth of the River Danube.

Phrygilanthus. Gk phrygilos, a finch, chaffinch; anthos, flower; probably because of the spreading of seeds by the Mistletoe Bird, *Dicaeum hirundinaceum*, which belongs to the family Dicaeidae (Flowerpeckers), not to the Finches (Fringillidae) or Weaver Finches (Ploceidae). Our two species, first in *Loranthus*, then in *Phrygilanthus*, are now in *Muellerina* (q.v.).

***Phyla.** Gk phyle, phylon, a tribe or race (cf. phylum, a sub-kingdom of animals or plants). As the plural of phylum is phyla, the coining of this generic name by Loureiro appears to have been unwise — another example, by the great Linnaeus, is the genus Cotyledon (family Crassulaceae). Our species, **P. nodiflora*, Fog-fruit, was formerly classified in *Lippia*, family Verbenaceae.

Phyllanthus. Gk phyllon, leaf; anthos, flower; in some foreign species the flowers grow on the edges of dilated leaf-like branchlets. A large genus of 600 species, of which 60 are in Australia (including 55 endemics), but Victoria has only 3 species, known as different kinds of spurge, as are our 8 species of *Euphorbia*, the family to which *Phyllanthus* belongs being Euphorbiaceae.

Phylloglossum. Gk phyllon, leaf; glossa, tongue; from the rather fleshy, linear-subulate radical leaves. Our species, *P.drummondii*, Pigmy Clubmoss, is one of many Australian plants named after James Drummond, the famous botanical collector and explorer in Western Australia (see 'The Drummonds of Hawthornden', by Rica Erickson). (The garden flower *Phlox drummondi* is named after his brother Thomas, who collected in North America, and was a naturalist on the second Arctic journey of Sir John Franklin.)

Bush-peas of Victoria — Genus Pultenaea — 11

By M. G. CORRICK*

Pultenaea costata H. B. Williamson in Proc. Roy. Soc. Vict. 33:140 (1921).

Pultenaea costata is one of several species of *Pultenaea* endemic to the Grampians, where it occurs mainly in the higher parts of the northern ranges, although it does not extend to the more exposed, rocky areas near the summit of the peaks.

P. costata is a spreading shrub, about 1 m high. The young stems are covered with pale hairs, but they become glabrous with age. The ovate, alternate leaves are 7-15 mm long and 2-5 mm wide and usually have three to five prominent longitudinal veins, as indicated by the species name. They taper into a long, pungent point, are concave above and recurved at the tip. Both surfaces are glabrous except for a few pale hairs on the underside of young leaves; the margins are minutely scabrid.

The lanceolate, dark brown stipules are about 7 mm long and taper into long, slender points.

The flowers are axillary, but are clustered in apparent heads at the tips of the branchlets. They are a rich orange, strongly marked with dark purple-brown on standard, wings and keel. They are about 12-15 mm long, with the standard about 11 mm high and 14 mm broad.

Fig. 14a. Known distribution of *Pultenaea costata* and *P. acerosa*.

The calyx is about 9 mm long with slender, pointed lobes. The lower part of the tube is glabrous, but the lobes have ciliate margins and are covered with long, white hairs. The ovate bracteoles have ciliate margins and a tuft of hairs at the base; they are attached immediately below the calyx tube and reach almost to the top of the lobes.

The flowers are subtended by leaves with enlarged stipules and also floral bracts. As in a number of other *Pultenaea* species a transition can be seen from the normal stipulate leaves to floral bracts, with the stipules enlarging and the leaf becoming progressively smaller, until the innermost flowers of the cluster are subtended by a bract alone.

The ovary and base of the long, slender style are covered with pale hairs. Although comparatively large, the ripe pod remains almost concealed within the calyx.

Flowering time extends from mid-October to late November. Plants at lower altitudes, such as along the Rose's Gap Road, will be likely to flower before the end of October, whereas in higher areas of the Wonderland Range the peak of flowering is usually after the middle of November.

Considerable variation in leaf size occurs in several populations of *P. costata* and some of the very narrow-leafed forms have been identified as *P. acerosa*, a closely related species. However, observations in several areas suggest that *P. costata* may hybridize, possibly with *P. mollis*, to produce a variation in leaf form, size of plant and growth habit. A particularly interesting community, showing a range of variation occurs round the picnic area at The Sundial.

SPECIMENS EXAMINED included: Grampians, Mt. Difficult, *J. W. Audas & C.*

*7 Glenluss Street, Balwyn, Victoria.

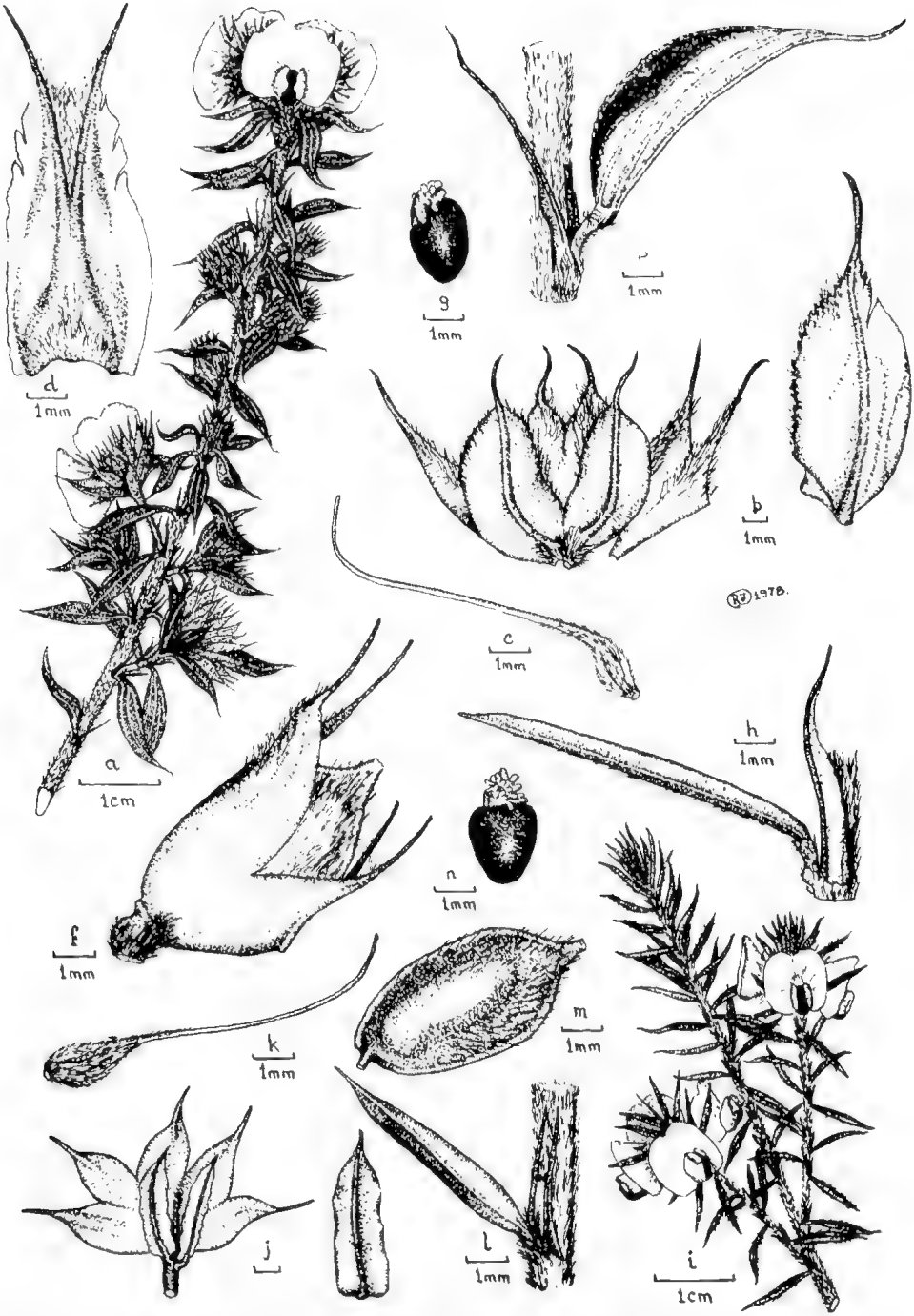

Fig. 14. a-h, *Pultenaea costata*; a, habit; b, calyx and bracteoles, bracteole drawn a little larger; c, style; d, floral bract; e, leaf and stipules, all from MEL 515371; f, pod; g, seed, from MEL 526356; h, narrow-leafed form from the Grampians, MEL 526287. i-n, *Pultenaea acerosa*; i, habit, from MEL 526422; j, calyx and bracteoles, bracteole drawn a little larger; k, style, from MEL 526335; l, leaf and stipules from MEL 526422; m, pod; n, seed, from MEL 526238.

D'Alton, November 1923 (MEL 526345); Grampians, Rose's Gap Rd., *M. G. Corrick 5622*, 16.x.1976 (MEL 515371); Grampians, Picnic area near The Sundial, *M. G. Corrick 5701, 5704, 5697*, 20 Nov. 1976 (MEL 526287, MEL 526284, MEL 526291); Grampians, *F. Mueller* (MEL 526356 Syntype).

Pultenaea acerosa R Br ex Benth in Flora Australiensis 2:131 (1864)

Pultenaea acerosa is recorded as occurring in western Victoria, however its main distribution is in South Australia; on Kangaroo Island, around Port Lincoln and in the Mount Lofty Range. Of the Victorian collections examined in the National Herbarium, Melbourne, all but two were collected in the Grampians and these appear to be the narrow-leafed form of *P. costata* referred to above. Of the remaining two specimens, one is marked "Wimmera" and is identical in appearance with the other Grampians collections, it seems most likely that it was in fact collected there; the second is a sterile specimen from near the South Australian border in the Red Bluff area, north of Yanic.

A description and drawing based on South Australian material is given here for comparison with *P. costata*. Information on occurrences of *P. acerosa* in Victoria, supported by good collections, would be welcome.

P. acerosa is a small, rigid shrub 30-60 cm high, with pubescent or tomentose stems. The alternate, linear-terete leaves are 5-10 mm long, grooved on the upper side and tapering into a strong, pungent point. They are glabrous except for a few loose, pale hairs on young growth.

The dark brown, lanceolate stipules, closely appressed to the stem are about 4mm long and taper into a slender tip.

The orange and dark red flowers are axillary, but usually clustered at the tips of the branches. The standard is 10mm high and 8mm broad with dark red lines in the throat, the keel is also dark red.

The calyx is about 7mm long with rather broad lobes which taper abruptly into slender points. It is glabrous except for the ciliate margins of the lobes. The ovate bracteoles are 4mm long and also have ciliate margins; they are attached immediately below the calyx tube and reach about half way up the calyx lobes. The flowers are subtended by leaves with slightly enlarged stipules, but floral bracts are absent.

The ovary is covered with short, pale appressed hairs and the lower one third of the style is also hairy. The short pale hairs persist on the pod, which is half concealed by the calyx.

Flowering time is about mid September to the end of October.

P. acerosa var. *acicularis* H.B. Williamson differs in having slightly longer needle-like leaves and very pale, usually solitary, axillary flowers. It occurs in the Mt. Lofty Range and on Kangaroo Island.

Although superficially rather similar to *P. acerosa*, the narrow-leafed forms of *P. costata* may be distinguished by the very long hairs on the calyx lobes and the standard which is broader than high. *P. acerosa* has only slightly enlarged stipules on the leaves below the flowers, whereas *P. costata* has numerous leaves with enlarged stipules clustered around the flowers and demonstrates the transition from leaves to bracts below the inner, youngest flowers of the inflorescence.

SPECIMENS EXAMINED included: Big Desert, 2 mls. E. of S.A. border & N. of Red Bluff, *A.C. Beauglehole 38346*, 18.vi.1972 (MEL 504795); Yorke's Peninsula, S.A., *W. Gill 164*, 30.ix.1890 (MEL 526335); Encounter Bay, S.A., *Miss J.L. Hussey 315*, 1894 (MEL 526422); Clarendon, S.A., *O. Tepper 453*, 24.xii.1881 (MEL 526328).

The Oak Leaf-miner

A new infestation of our street trees?

BY D. E. McINNES* OF FNCV MICROSCOPY GROUP

At the FNCV meeting in February 1978 attention was drawn to extensive damage to oak leaves caused by some sort of leaf-miner. Specimens of the leaves were shown, and under microscopes were exhibited the larvae in the mines, pupae, and live moths that had hatched from the pupae. Also under a microscope were specimens of what was thought to be pupae of wasps that may be parasites on the miner larvae.

A great deal of interest was aroused, and at a later meeting of the FNCV Microscopy Group members showed more leaf-miner moths and also several wasps that had emerged from miner-infested oak leaves. Mr. John Strong had mounted six different wasps. Were they parasites on the leaf-miner larvae?

In view of the interest aroused, Dr. Tim New of Latrobe University was asked if any information was available on the infestation of oak leaves. He replied that work was being done in Melbourne and sent a copy of an article by Dr. I. F. B. Common in the Journal of the Australian Entomological Society. This article is ideal as general background for the ordinary person interested in natural history, and is re-printed on the next page by permission of the author and of the editor Dr. Rice.

Dr. New has contributed an article on the extent of the miner infestation in the Melbourne area, and members will appreciate his prompt co-operation and assistance.

Country Members —
Is the leaf-miner in your area?

A visit in March , 1978, showed no signs of the leaf-miner on oak trees at Creswick, and country members could keep an eye on the oaks in their area. Reports of infestation will be of great interest to this Club; simply send your findings to the FNCV Microscopy Group.

Make Your Own Observations

The interested layman can carry out investigations of his own. Twigs of oak leaves showing signs of blisters caused by leaf-miners should be placed in a large transparent plastic bag; then tie the open end around the neck of a 1 lb. jam jar. The larvae will form pupae under cover of the leaf mine, and a few weeks later the moths will hatch and make their way to the jar. If any parasitic wasps are present they will do the same. Examine all specimens with a hand lens or with a microscope if you have one. Try your hand at making mounts of the moths and wasps.

(Editor's Note: All this material was received in time for publication in June "Naturalist" but as oak leaves are not available during winter (except evergreen species) it was decided to hold the articles until this October issue when leaf-miners might be active again.)

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The Oak Leaf-miner *Phyllonorycter messaniella* (Lepidoptera: Gracillariidae) established in Australia

BY I. F. B. COMMON*

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Abstract

The European oak leaf-miner *Phyllonorycter messaniella* (Zeller) (Lepidoptera: Gracillariidae) is recorded from Australia for the first time. The larvae have damaged several ornamental deciduous and evergreen oaks and chestnuts in the Australian Capital Territory and New South Wales. Six hymenopterous parasites have been reared. The adult moths and larval mines are figured.

In January, 1976, two adults of *Phyllonorycter messaniella* (Zeller) were submitted to me for identification by Mr. C. Nazer of the Canberra City Gardens Administration. These had been reared from leaf-mines on deciduous oaks, *Quercus* sp., grown as street trees. The mines were numerous and the foliage of the affected trees showed considerable bronzing. Examination of additional oaks in other parts of the city revealed a heavy general infestation and counts of leaf-mines on a random sample of 10 more or less mature leaves of *Q. lusitanica* Lam. yielded a mean of 15.3 mines per leaf (Fig. 1). A survey of Canberra ornamental trees by Mr. Nazer showed that several species of deciduous and evergreen oaks were attacked, as well as the chestnut *Castanea sativa* Mill. Among the most severely affected were *Q. lusitanica* and *Q. robur* L., whereas *Q. palustris* Muenchh. and *Q. borealis* Michx., and the evergreen oaks *Q. suber* L. and *Q. ilex* L. had only a few mines. Enquiries and observations in New South Wales indicated that oaks in the Sydney metropolitan area and at Wollongong, Menangle Park, Bundanoon and Bathurst were also attacked, although no mines were noticed at Armidale and Glen Innes.

These are the first records in Australia of this pest of exotic ornamentals. *P. messaniella* is of European origin, although it has been present in New Zealand since 1951 (Wise 1953a). It spread rapidly in New Zealand and by 1954 was distributed over most of the North Island and the Nelson district of the South Island (Wise 1954). The following year it spread much further south (Wise 1955). Wise (1953b) recorded the leaf-miner on five species of *Quercus* and on several other hosts including *Fagus* (beech), *Nothofagus* (Antarctic beech), *Betula* (birch), *Carpinus*, *Parrotia*, *Liquidambar*, *Feijoa*, *Castanea*, *Prunus*, *Carya* (pecan), and *Malus* (apple). However, Swan (1973) found that its original host potential had not in fact been realised and in 1972 he had found mines only on *Quercus* spp., *Fagus*, *Betula* and *Castanea*.

The genus *Phyllonorycter* Hübner, formerly known as *Lithocolletis* Hübner, contains numerous Palearctic species mining in the leaves of oaks and other trees. It is represented in Australia by two small species groups, one mining in the leaves of Malvaceae, Tiliaceae and Sterculiaceae, and the other in the leaves of Papilionaceae. Throughout the genus the mines are confined to the epidermis during the first three larval instars, but the fourth instar become characteristically "tentiform". This form of mine results when the larva spins a layer of silk over the inner surface of the leaf cuticle, and the silk contracts and forms a fold in the cuticle and a corresponding convex buckling of the opposite leaf surface. Pupation occurs within the mine and the

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Fig. 1. Underside of *Quercus* sp. leaf with larval mines of *Phyllonorycter messaniella*.

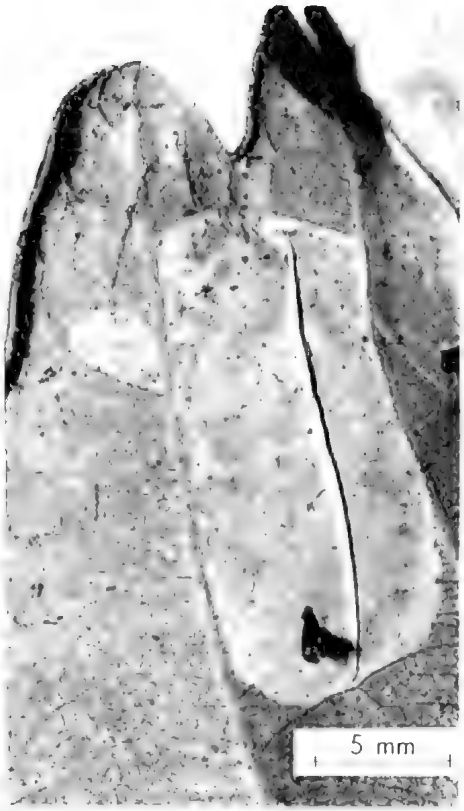

Fig. 2. Mature larval mine with protruding pupal exuvium and longitudinal fold in leaf cuticle covering mine.

pupa is protruded through an aperture in the covering cuticle before the adult emerges.

In *P. messaniella* the mines occur on the underside of the leaf (Figs. 1, 2), but mature mines are also clearly visible on the upperside by the eroded and buckled areas of the leaf, which soon turn brown in colour The adults (Fig. 3) have a wing span of only about 7 mm; they are pale shining brown in colour with a distinctive wing pattern. The frons is white and the head bears a characteristic tuft of erect hairs (Fig. 4), fawn in colour. At rest the adult holds its body parallel to but clear of the substrate, unlike many other Gracillariidae in which the body is held at a steep angle.

In New Zealand *P. messaniella* can pass through three generations annually (Swan 1973). The spring and summer generations are thought to be largely restricted to deciduous oaks and the other deciduous hosts. Overwintering occurs in the larval stage on evergreen oaks, primarily *Q. suber* and *Q. ilex*, without a diapause.

Before 1957 the only parasite reared from *P. messaniella* in New Zealand was the European hymenopteron *Pnigalio pectinicornis* (L.), which had apparently been introduced accidentally. In 1955 the DSIR requested the Commonwealth Institute of Biological Control to search for parasites of *P. messaniella* and in 1957 *Apanteles circumscriptus* (Nees) and *Enaysma splendens* Delucchi were introduced from Europe and established in New Zealand. At Christchurch Swan (1973) found that *Apanteles* was the more abundant of the two, but *Enaysma* was almost as common where

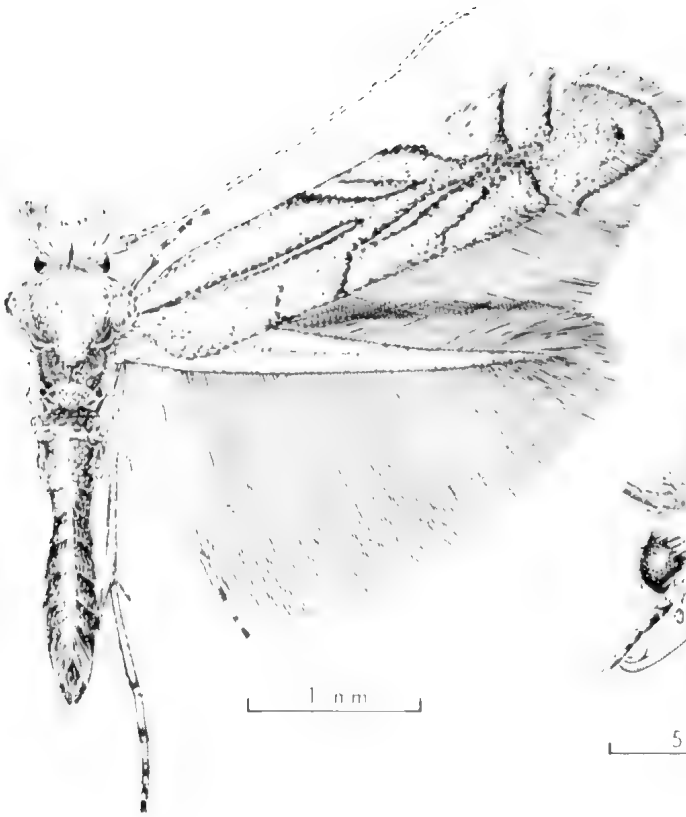

Fig. 3.
Adult male
Phyllonorycter messaniella

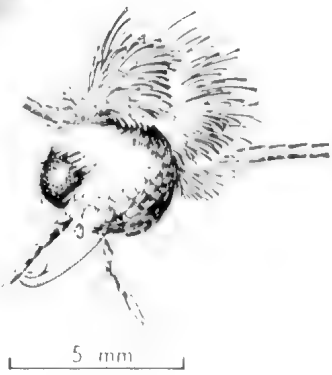

Fig. 4.
Anterolateral
view of head

leaf-miner populations were low. These two parasites were thought to have largely replaced *Pnigalio*. Whereas counts of more than 40 mines per leaf were recorded when the infestation at Nelson was at its peak, by 1972 the density had dropped to 2.3 mines per leaf. However, this was still well above that of Switzerland, where one mine per 20 to 30 leaves was considered a heavy infestation.

At Canberra six hymenopterous parasites have so far been reared from collections of mined oak leaves. Five of them belong to the family Eulophidae and are referred to widespread genera which occur naturally in Australia: *Neochrysocharis* sp., *Achrysocharella* spp. (two species), *Elachertus* sp. and *Sympiesis* sp. One belongs to an unidentified genus and species of Ichneumonidae. Examples of each of these have been deposited in the Australian National Insect Collection, Canberra.

Acknowledgments

Thanks are due to Dr. E. F. Riek for identifying the parasites, and to Mr. C. Nazer, Dr. C. N. Smithers, Misses J. C. and S. Cardale, Mrs. H. Cameron, Mr. N. R. Badans and Mr. E. D. Edwards for providing notes or samples of mined oak leaves. Mrs. Sybil Monteith kindly prepared the drawings in Figs. 5 and 6, and Mr. C. Lourandos the photograph in Fig. 3.

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Notes on the Oak Leaf-Miner in the Melbourne area

BY T. R. NEW*

Introduction

Oak trees (*Quercus* spp) in northern temperate regions support some of the largest-known assemblages of phytophagous insects. In contrast, oaks support few insect species in many countries to where they are introduced, but some introduced oak insects may demand attention as aesthetic or potential forest pests. Thus, for example, biological control attempts were made against exotic oak aphids in Tasmania some years ago (Wilson 1960). Representatives of the large complexes of Lepidoptera associated with oaks elsewhere have, until recently, been absent from Australia although Evans (1939) noted occasional attacks on oak by several native Lepidoptera.

The recently introduced oak leaf-miner (*Phyllonorycter messaniella* (Zeller)), recorded by Common (1977), is of particular interest because of its aggressive colonisation ability and because its biology and parasite complex have been studied both in its native Europe and in New Zealand, where it became the target of biological control attempts some twenty years ago. Since Common's paper appeared, the moth has been recorded from Norfolk Island (Smithers 1977) and has been found abundantly in Victoria, where the conspicuous blotch mines on the undersides of oak leaves are now a familiar sight in the Melbourne metropolitan area.

The purpose of this note is to augment the information published by Common (1977), and to report some preliminary findings on *P.messaniella* around Melbourne: a regular sampling programme, involving examination of series of mines from some twenty species of oaks and some other trees has been undertaken since May 1977, with the aims of clarifying the lifehistory and parasite spectrum of *P.messaniella* around Melbourne.

Comments on biology

There are strong indications that the biology of the moth is similar to that documented for New Zealand (Wise 1953a, b, 1954, 1955, unpublished), where the species rapidly increased its host range following introduction and showed the ability to increase to epidemic levels. It seemed that the moth almost completely utilised the foliage of its more usual host plants, and a xenophagically increased host range allowed population growth to continue — an unusual strategy in leaf-miners. Amongst the trees attacked by *messaniella* during this initial "build-up phase" were two species of *Nothofagus*, and the suspicion that it might become a forest pest in New Zealand prompted investigation of its parasite complex in Europe, and subsequent biocontrol. There are currently no records of *messaniella* attacking the Australian *Nothofagus cunninghami*; the single specimen in the Royal Botanic Gardens (which is within 200 m of very heavily infested *Quercus*) has apparently not yet been attacked and recent laboratory tests have failed to

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Table 1. Host trees of *Phyllonorycter messaniella* in Melbourne, 1977-78.

CATEGORY	SPECIES
a) Heavily infested	
i. Summer hosts	*Quercus alba bicolor, borealis, canariensis, cerris, dentata, douglassii, lusitanica, macrocarpa, mirbeckii, montana, pyrenaica, pubescens, robur, ruba.*
ii. Winter hosts	*Q.coccifera, ilex, phillyreoides.*
b) Lightly infested	*Q.agrifolia, coccinea, palustris, wislezenii, Fagus sylvatica, Carpinus betulus, Lithocarpus* sp.
c) New Zealand host genera examined in Australia, with no mine records to date	*Nothofagus, Betula, Liquidambar, Pyrus, Prunus.*

Table 2. Summary of infestation levels and parasite species of *P.messaniella* in various regions.

AREA	INFESTATION LEVELS (NOS. MINES/LEAF)	NO. PARASITE SPP.	REFERENCES
Europe	Low (< 1)	21	Delucchi 1958
N.Zealand 1950s	High (80)	1	Given 1959
1970s	Low (2.3)	3	Swan 1973
Australia ACT	Moderate-High (15+)	6	Common 1977
Victoria	High (50+)	8	New, unpublished
Norfolk I.	High (60+)	?	Smithers 1977

induce the moth to oviposit on seedling *Nothofagus*.

It seems likely that, if the New Zealand sequence is paralleled, *messaniella* may markedly extend its host range over the next few years and then contract to a relatively small number of host species. Indeed, there is evidence that during the last year "new" hosts have been infested in Melbourne, and numbers have increased markedly on some species of *Quercus* earlier considered unsuitable (Table 1).

The moth's three annual generations in New Zealand (Swan 1973) are paralleled in Victoria, although slightly different generation times on different host species give the impression of more generations being present. It breeds throughout the year, by moving onto evergreen hosts for the winter generation and then dispersing to other hosts as foliage becomes available in spring. The moth bred on evergreen oaks in Melbourne through the winter of 1977, and the life cycle thus has the potential for continuous increase in numbers throughout the year — undoubtedly a major factor influencing its rapid spread — and the possibility of "escaping" from more seasonal natural enemies. Maximum infestation levels found in Victoria are compared with those recorded elsewhere in Table 2, together with the numbers of parasite species recorded.

Perhaps the major difference detected to date between *messaniella* in Australia and in New Zealand is that Australian populations support a much more diverse complex of hymenopterous parasites. In Victoria, at least eight species of Chalcidoidea are found as parasites or hyperparasites, and the most abundant species are found throughout the year. Levels of parasitism have reached a maximum of about 65% in specific samples, but overall have been in the order of 20% each month, with much lower levels during early winter. Little difference in parasite

levels occurs in samples from different host species at the same time of the year.

It also appears, although identifications are not yet complete, that several parasite species have been found either only in A.C.T. or only in Victoria: the Ichneumonid recorded by Common (1977), for instance, has not been found in any of our samples to date. Several of the Victorian parasites have been reared from other mining Lepidoptera (predominantly those mining phyllodes of *Acacia* spp) and one from the eucalypt-mining sawfly *(Phyllacteophaga)* and these other miners generally support fewer parasite species than does *messaniella*.

In contrast, in New Zealand, there was no evidence of any native parasite moving on to *messaniella* after its arrival, and the only parasite initially recorded was a common European species.

Nevertheless, the additional complex of parasites in Australia still permits high infestation levels to occur, and details of the interactions of the various wasp species are still unclear. It is possible that native parasites may increase in effect once the host population becomes more stable but, should biocontrol attempts eventually be deemed worthwhile, additional parasites from Europe may be preferable. Several of these (including *Apanteles* and *Enaysma*, both introduced and successful in New Zealand) show different seasonal peaks, and could possibly be used to inflict a more seasonal mortality on the moth.

Acknowledgements

I am very grateful to Dr D. M. Churchill for permission to work in the Royal Botanic Gardens, and to Mr Peter Webb and other members of the Gardens staff for much help. Mr K. A. J. Wise generously sent me copies of his unpublished notes on *P. messaniella* in New Zealand, and Mrs J. M. Tenberge and Miss P. Fischer helped with sampling and examination of samples.

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The Geomorphology of the Gippsland Lakes Region

This monograph by E. C. F. Bird provides an account of the geomorphological evolution of the Gippsland Lakes, together with their adjacent terrain, and describes and analyses the changes in progress around their shores. It can be purchased for $3.00 and is available from the Ministry for Conservation's Head Office at 240 Victoria Parade, East Melbourne, Victoria.

Alterations and additions to the vascular flora of Victoria — Part 2.

By A. C. Beauglehole†

Introduction

Part 1* of this paper dealt with name changes to the Victorian flora and also included reference to some new names. This section lists all known additions to the state's flora available to the author since the publication of "A Handbook to Plants in Victoria" by J. H. Willis (1970 & 1972) or "The Distribution of Victorian Plants" by Churchill and de Corona (1972). Additions found in Willis (1972) but not in Churchill and de Corona (1972) are included to assist readers to up-date their copy of the latter.

The list includes some undescribed taxa and refers to others whose identity is in doubt. While some of these may not eventually be recognized at species level, they are included here so that field workers will know in which groups of species there are taxonomic uncertainties and to help indicate where careful checking is needed. Where doubt occurs, the author would be glad to receive good collections, in duplicate, with full locality details.

Information about a plant's distribution is valuable, regardless of whether it has a name or not. There are several hundred rare or endangered Victorian species for some of which full details of distribution are lacking; several are apparently already lost. Knowledge of distribution in relation to land status will assist us to save our rare plants and among these may be some which lack names.

In order to assist those already working to record more fully the distribution of plants in Victoria and to encourage others to participate the author is collaborating with Dr. R. F. Parsons to produce detailed up-to-date checklists.

Working copies have already been distributed to some helpers and copies, accompanied by maps and instructions, are available to others who may wish to contribute to the scheme. Nomenclature in these checklists includes the alterations and additions given in this paper.

Some of the additions to our flora which appear in the following list are the result of taxonomic revisions in which large complex species are split into smaller, distinct entities. Other additions are of plants already known elsewhere, but which have only recently been recognized as occurring in Victoria.

Many people have contributed to the discovery and recognition of these species. A large number of them were found by the author during extensive field work carried out during the past ten years and for these, voucher specimens are lodged at the National Herbarium of Victoria (MEL). The other records come from a variety of sources and for some of these, vouchers may not be held at MEL. In all cases, fuller details than it was possible to list below are available from the author. For a number of species listed, confirmation is needed of their occurrence in Victoria at present (e.g. *Neurachne munroi*). Doubtful cases like this are included to alert field workers to the possibility of their presence in Victoria and thus to try to reduce the chances that they will be overlooked in future work.

New names listed are followed by their author and place of publication; new records of already known plants are followed wherever possible by a reference to a relevant text giving a description of the plant. References to periodicals appear in the main text; references to books are cited by numbers in italics and full titles appear in the bibliography. Distributions are shown according to the Victorian plant mapping grid system (A to Z).

Some errata found in Pt. 1 of this paper are given at the end of the paper.

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*See Victorian Naturalist 95: 67-74 (1978)

Additions to the vascular flora of Victoria

Acacia nyssophylla F. Muell. in *20*:4 **A**
Acacia subporosa F. Muell. in *21*:24 **Z**
Acacia subtilinervis F. Muell. in *21*:33 **W**
Acacia williamsonii A. B. Court in *Muelleria* 2:163 (1972) **HM**
Acacia sp. aff. microcarpa F. Muell. **ABCFG**
Acacia sp. aff. omalophylla A Cunn. ex Benth. **A**
Acacia sp. aff. pendula A. Cunn. ex G. Don.; see *28*:238 **AFG**
Acacia sp. aff. penninervis Sieber ex DC. **W**
Acacia sp. aff. sowdenii Maiden; see *28*:237 **AFG**
Acaena agnipila Gandoger; see *28*:210 **DEHJKMN PSTVWXYZ**
Acaena echinata Nees; see *28*:210 **CDEHJKMNP RSTVWX**
***Acer pseudoplatanus** L.; see *28*:360) **(Spasmodic)**
Adiantum diaphanum Blume; see *27*:25, *26*:15 & *18*:104 **T**
***Aira cupaniana** Guss.; see *11*:584 **EH**
***Aira elegantissima** Schur in *Lejeunia 75*:74 (1975) Determinations by B. K. Simon, BRI. **DM**
Alternanthera sp. A
Amaranthus macrocarpus Benth.; see *4*:331 **AF**
***Aquilegia vulgaris** L. Sp. Pl. 1:533 (1753); For recent description see *Flor. Europ.* 1:239 (1964). **W**
Arthrocnemum spp. : J. H. Willis, 2:109 (1972) and P. G. Wilson pers. comm. regard Black's two varieties of **A. halocnemoides** Nees as probably two good species. Recorders must treat them, when listing, as two separate entities.
Arthrocnemum halocnemoides Nees var. **pergranulatum** J. M. Black; see *4*:319 & *28*:109 **AB CEFGLNPIWX**
Arthrocnemum halocnemoides Nees var. **pterygospermum** J. H. Black; see *4*:319 & *28*:109 **BFG**
Arthrocnemum pruinosum Paulsen in *Dansk Bot. Arkiv.* ii No. 8:63 (1918) **AG**
***Asparagus setaceus** (Kunth) Jessop in *Bothalia* 9:51 (1966) **A**
Asplenium hookeranum Colenso; see *27*:35, *26*:34 & *18*:120 **S**
Banksia sp. **DJT**
***Bassia birchii** (F. Muell.) F. Muell.; see Ising, *Trans. R. Soc. S. Aust.* 88:63 (1964) & 13:118 (introduced into Victoria) **CMR**
Bassia convexula Anderson; see Ising, *Trans. R. Soc. S. Aust.* 88:63 (1964) & 13:118 **AF**
Baumea arthrophylla (Nees) Boeck; see Blake, *Contr. Qd Herb.* 8:28 (1969) **E**
***Bidens pilosa** L.; see *2*:459 **A**
Boronia citriodora Gunn ex Hook. f.; see *12*:105 **S**
Brachycome scapiformis DC.; see *28*:675 **CDEJ KRSVYZ**
***Brassica fruticulosa** Cyrillo; see *28*:169 **KW**
***Brassica juncea** (L.) Czern.; see *4*:377 **E**
***Bromus alopecuroides** Poir.; see Norton, *Keys to Grasses of N.S.W.* 26 (1977) **P**
***Bromus racemosus** L.; see *15*:50 **N**
Brunoniella pumilio (R. Br.) Bremekemp; see *28*:575 **Z**
***Bupleurum semicompositum** L.; see *5*:658 **C**
Caladenia hastata (W. H. Nicholls) H. M. R. Rupp in *Vict. Nat.* 58:198 (1942); see *27*:390 under C. reticulata R. D. FitzG. (The author and others regard this as a good species.) **DE**
Caladenia toxochila R, Tate; see *3*:231 **C**
Calandrinia volubilis Benth.; see Todd, *Muelleria* 3:191-196 (1976) **A**
***Carduus pycnocephalus** L.; see *28*:761 **ABDEGH KLMSVW**
Carex sp. aff. archeri Boott **S**
Cassinia sp. E
Celmisia sp. aff. asteliifolia Hook. f. **S**
***Cenchrus echinatus** L.; see Weston, *Nuytsia* 1:378 (1974) **G**
***Cenchrus longispinus** (Hack.) Fern; see Weston, *Nuytsia* 1:379 (1974) **ABCFGHKMR**
***Cerastium semidecandrum** L.; see *28*:138 **X**
***Chenopodium sp. aff. suecicum** J. Murr.; see *28*:86 **VWYZ**
Chorizandra sphaerocephala R.Br.; see *2*:608 **Z**
Chorizandra sp. E
***Conicosia ?bijlii** N. E. Br.; see *28*:127 **P**
***Conyza albida** Willd. ex Spreng.; see Michael, Proc. *6th Asian-Pacific Weed Sci. Conf.* 1:87-95 (1977) **NWZ**
Correa sp. aff. reflexa (Labill.) Vent.; see *28*:340 **CDJ**
***Cortaderia sellowiana** (Schult.) Aschers. & Graebn.; see *27*:168 (The author has seen this spreading near Bendigo) **M**
Corybas fordhamii (H. M. R. Rupp) H. M. R. Rupp; see *27*:449 **DKTZ**
Corybas hispidus D. L. Jones in *Vict Nat.* 90:96 (1973) **VW**
Crassula sp. aff. macrantha (Hook. f.) Diels & Pritzel **CD**
Crassula sp. aff. colorata (Nees) Ostenf. **CD**
***Crocosmia aurea** (Pappe ex Hook.) Planch.; see *27*:339 **NP**
Croton verreauxii Baill.; see *2*:252 **Z**
Cyperus bifax C. B. Clarke in *Kew Bull. Add. ser.* 8:13 (1908) **G**
Cyperus laevigatus L.; see *2*:602. Determined by N.S.W. (unknown to author) **Grid ?**
Cyperus sphaeroideus L. Johnson & O. Evans in *Contr. N.S.W. natn. Herb.* 46:372 (1973) **MRVWZ**
Cyperus unioloides R. Br.; see *27*.224 **V**
Dampiera sp. aff. scottiana F. Muell. **S**
Dampiera sp. (A) CJM
Dampiera sp. (B); see *28*:644 **W**
Danthonia monticola J. W. Vickery in *Contr. N.S.W. natn. Herb.* 2:280-281 (1956) **CDJRZ**
Danthonia sp. D
Darwinia camptostylis B. G. Briggs; see *28*:460 **Z**
***Datura wrightii** Regel; see Haegi, *Aust. J. Bot.* 24:431-433 (1976) **CR**
Daviesia sp. M
Deyeuxia decipiens (F. Muell.) J. Vickery; see *2*:654 **K**
Deyeuxia sp. aff. angustifolia J. W. Vickery; see *27*:142 **V**
Dichelachne rara (R. Br.) Vickery; see *2*:655 **V**
Dillwynia ramosissima Benth. in *Ann. Wiener Mus. Naturgesch* 2:79 (1840) **JMNV**
Diplachne muelleri Benth.; see *3*:113 **G**
Dipodium hamiltonianum F. M. Bailey; see *25*:126-127 **RW**
***Echinochloa cruspavonis** (Kunth) Schult.; see Vickery, *Flora of N.S.W.*, 19:201-203 (1975) **S**
***Echinochloa utilis** Ohwi & Yabuno; see Vickery, *Flora of N.S.W.*, 19:197-198 (1975) **CEFPW**
Echinopogon caespitosus Hubbard; see *2*:654 **S**
***Eleusine indica** (L.) Gaertn. see *2*:644 **E**
***Emex spinosa** Campd.; see Weiss & Julien, *J. Aust. Inst. Agric. Sci.*, 41:211-213 (1975) **A**
Epacris coriacea A. Cunn. ex DC.; see *2*:408 **SW**
Epacris glacialis (F. Muell.) M. Gray in *Contr. Herb. Aust.* 26:5-8 (1976) **RSV**
Epilobium brunnescens (Cockayne) Raven & Engelhorn in *N.Z. J. Bot.* 9:350 (1971) **S**
Epilobium willisii Raven & Engelhorn in *N.Z. J. Bot.* 9:347 (1971) see also *28*:465 **W**

Eragrostis molybdea J. W. Vickery; see *27*:433 **A**
Eragrostis pilosa (L.) Beauv.; *3*:118 **M**
Erigeron conyzoides F. Muell., see *28*:681 **VWZ**
Eriocaulon australasicum (F. Muell.) Koern.; see *27*:281 **DF**
Eriostemon angustifolius P. G. Wilson; see *28*:333 **ABCDHJM**
Eriostemon virgatus A. Cunn. ex Hook. f.; see P. G. Wilson, *Nuytsia* 1:50 (1970) **Z**
Eriostemon sp. W
Erythranthera australis (Petrie) Zotov in N.Z. J. Bot. *1*:124 (1963) **V**
Eucalyptus agglomerata Maiden; see *28*:412 **Z**
Eucalyptus angophoroides R. T. Baker in *Proc. Linn. Soc. N.S.W.* :25 (1900) **IWZ**
Eucalyptus dealbata A. Cunn. ex Schau.; see *7*:137 **U**
Eucalyptus saxatilis Kirkpatrick & Brooker in *Aust. For. Res.* 7:209-213 (1977) **VW**
Eucalyptus yarraensis Maiden & Cambage; see *28*:428 **DJNT**
Euphorbia planiticola D. C. Hassall in *Aust. J. Bot.* 25:446 (1977) **GH**
***Euphorbia platyphyllos** L.; see *28*:350 **T**
Euphorbia tannensis Spreng.; see Hassall, *Aust. J. Bot.* 25:436 (1977) **A**
Euphrasia sp. (A) VW
Euphrasia sp. (B) V
***Euryops abrotanifolius** (L.) DC.; see *6*:889 **N**
Eutaxia diffusa F. Muell.; see *28*:273 **BCFGHJM**
Festuca benthamiana J. W. Vickery in *Contr. N.S.W. Natn. Herb.* 1:13 (1939) **SVW**
Frankenia sp. aff. gracilis Summerhayes; see *28*:395 **A**
Gahnia ancistrophylla (F. Muell.) Benth.; see *3*:168 **D**
Gahnia subaequiglumis S. T. Blake; see *28*:410 **SZ**
Galium ciliare Hook. f.; see *30*:272 **EKRSVWZ**
Galium sp. (A) EK
Galium sp. (B) CDEJ
Galium sp. (C) DJMRSVWZ
Geranium ?obtusisepalum Carolin in *Proc. Linn. Soc. N.S.W.* 89:344 (1965) **DJ**
Glossostigma sp.; see *28*:564 **VW**
***Glyceria declinata** Breb.; see *15*:86 **NPR**
Gnaphalium fordianum M. Gray in *Contr. Herb. Aust.* 26:2-5 (1976) **SV**
Gnaphalium sphaericum Willd.; see Drury, *N.Z. J. Bot.* 12:390 (1974) Widely distributed and common, but **G. involucratum** Forst. f. apparently confined for Victoria to southern and eastern regions. **G. involucratum: DEKNPZ G. sphaericum:** probably all grids
Gonocarpus humilis Orchard in *24*:195-198 widely distributed in Victoria except north-west but **G. teucrioides** (DC.) Schlechtendal recorded only for far eastern region, viz., **Z**
Goodenia heterophylla Sm.; see *2*:441 **S**
Goodenia sp. (A) CDEHM
Goodenia sp. (B) R
Grammitis meridionalis Parris in *Bot. J. Linn. Soc.* 70:21-43 (1975) **N**
Gratiola pubescens R. Br. in *8*:435 **EP**
Grevillea glabella R. Br.; see D. J. McGillivray, *Telopea* 1:28 (1975) **CGHMN**
Grevillea microstegia W. M. Molyneux in *Muelleria* 3:141-145 (1975) **DJ**
Grevillea willisii R. V. Smith & D. J. McGillivray in *Muelleria* 3:102-111 (1975) **VW**
Grevillea sp. aff. aquifolium Lindl. **JN**
Grevillea sp. aff. microstegia W. M. Molyneux **J**
Grevillea sp. aff. willisii R. V. Smith & D. J. McGillivray **VW**
Haloragis aspera Lindl. see *24*:110-115 & *28*:470 as **H. *heterophylla*** Brongn. var. ***aspera*** (Lindl; *ut sp.*) Schindl.
ABCDFGJKMNPRV
***Helianthus annuus** L.; see *2*:459 **AFG**
Helichrysum viscosum Sieber ex Spreng.; see *9*:384 **HJMRVWZ**
Helichrysum sp. aff. acuminatum DC. **DEPI**
***Heliotropium amplexicaule** Vahl; see *2*:484 **R or V**
***Heliotropium sp. aff. europaeum** L. **BCFGL**
Hibbertia sp. (A) CD
Hibbertia sp. (B) S
Hibbertia sp. (C) S
Hierochloe submutica F. Muell.; see Vickery, *Flora of N.S.W.* No. 19 part 2:280 (1975) **V**
***Hordeum glaucum** Steud.; see Cocks, Boyce & Kloot, *Aust. J. Bot.* 24:651-662 (1976) **ABEGHN**
Hydrocotyle bonariensis Lam.; see *13*:247 **Z**
Hydrocotyle sp. SVW
***Hypecoum pendulum** L.; see Aston, *Muelleria* 3:177-182 (1976) **G**
Indigofera signata (F. Muell.) Domin; see *28*:299 **R**
***Ipomoea indica** (Burm.f.) Merrill; see *28*:544 (as *Ipomaea congesta R. Br.)
(Note spelling of Ipomoea) **NP**
Isoetes sp. EHR
Juncus amabilis Edgar in *N.Z. J. Bot.* 2:186 (1964) **CDEHJKLMNPRTVWYZ**
Juncus aridicola L. A. S. Johnson in *29*:322-323 **AELMR**
Juncus continuus L. A. S. Johnson in *29*:325 **RSTWXZ**
Juncus flavidus L. A. S. Johnson in *29*:325-326 **ABCDEGHJKLMNPRSVWZ**
***Juncus gerardii** Loiseleur; see Nilsson & Snogerup, *Bot. Notiser* 124:438 (1971) **E**
***Juncus imbricatus** Laharpe; see *2*:587 **M**
***Juncus microephalus** H.B.K.; see *14*:148 **NPT**
***Juncus oxycarpus** E. Mey. see *19*:3 **DJ**
Juncus procerus E. Mey.; see *27*:442 **DEJKNPSTWXZ**
NOTE: Letters in brackets for following **Juncus spp.** belong to coding system of L. A. S. Johnson
Juncus sp. (I) SVWZ
Juncus sp. (II) KRSVWZ
Juncus sp. (F) RSVWZ
Juncus sp. (Q) MR
Juncus sp. (A) CDHJMNRSW
Juncus sp. (O) HJMR
Juncus sp. (U) SV
Koeleria australiensis Domin; see *9*:34 **S**
***Koeleria cristata** (L.) Pers.; see *17*:243 **NRW**
***Lactuca virosa** L.; see *6*:492 **A**
***Lagarosiphon major** (Ridley) Moss; see *1*:240 **N**
Lagenifera montana Hook. f.; Drury, *N.Z. J. Bot.* 12:390 (1974) **SVW**
***Leersia oryzoides** (L.) Swartz; see Corrick, *Vict. Nat.* 93:67-68 (1976) **N**
Lepidium sp.; see *28*:176 **EKN**
Lepidium pseudotasmanica Thell.; see *12*:39 **T**
Leptospermum coriaceum (F. Muell. ex Miq.) Cheel; see *28*:445 **ABCFG**
***Leucojum aestivum** L.; see *13*:85 **K**
***Limonium sinuatum** (L.) Mill.; see *28*:516 **GHN**
***Lomandra obliqua** (Thumb.) MacBride, see Lee, *Flora of N.S.W.*, 34:39 (1966) **Z**
Luzula acutifolia Nordenskiold in *Bot. Notiser* 122:85 (1969); see also Edgar, *N.Z. J. Bot.* 13:791-794 (1975) **RV**
Luzula alpestris Nordenskiold in *Bot. Notiser* 122:84 (1969) **VW**
Luzula atrata Edgar in *N.Z. J. Bot.* 13.781-802 (1975) **V**
Luzula australasica Steudel; see Nordenskiold, *Bot. Notiser* 122:79 (1969) **EKRSVWZ**

Luzula densiflora (Nordenskiold) Edgar in *N.Z. J. Bot.* 13:786-788 (1975) **EHJMNPRSVWZ**
Luzula flaccida (Buch.) Edgar in *N.Z. J. Bot.* 13:786 (1975) **DEJKNPRSTVWXYZ**
Luzula meridionalis Nordenskiold in *Bot. Notiser* 122:71 (1969) **CEHJKMNPRZ**
Luzula novaecambriae Gandoger; see Edgar, *N.Z. J. Bot.* 13:790-791 (1975) **SV**
Luzula oldfieldii Hook. f.; see Edgar, *N.Z. J. Bot.* 13:789-790 (1975) **V**
Luzula ovata Edgar in *N.Z. J. Bot.* 13:788-789 (1975) **DVW**
***Lysimachia japonica** Thunb.; see *28*:514 **W**
***Lysimachia vulgaris** L.; see *28*:514 **V**
Maireana lobiflora (F. Muell.) P. G. Wilson *Nuytsia* 2:25-26 (1975) **AG**
Maireana trichoptera (Black) P. G. Wilson in *Nuytsia* 2:31-32 (1975) also *28*:104 as *Kochia excavata* J. M. Black var. *trichoptera* J. M. Black **ABFG**
***Malva sylvestris** L.; see *28*:377 **NPS**
Marsilea mutica Mett.; see *1*:40-41 **NSWX**
***Medicago littoralis** Rhode ex Loisel (Publication unknown to present author) **BFG**
Melaleuca sp. aff. ericifolia Sm.; see *28*:455 **MSW**
***Melianthus major** L.; see *10* (no page number) & *28*:356 (the latter not regarding it as naturalized, however the author has seen a colony spreading near Mt. Napier). **D**
***Mesembryanthemum nodiflorum** L.; see *4*:337 (as **Psilocaulon caducum* (Ait.) N.E.Br.) and *13*:133 (as **Gasoul nodiflorum* (L.) Rothm.) **ABG**
Mitrasacme sp. KPWZ
***Monopsis simplex** (L.) E. Wimm. in Engler & Diels, *Pflanzen.* 4 (276b:699) **D**
Neurachne munroi (F. Muell.) F. Muell.; see Blake, *Contrib. Qd. Herb.* 13:14-15 (1972) **C**
***Nicotiana tabacum** L.; see *28*:558 **M**
Nymphoides sp. aff. exiliflora; see *1*:117 **SW**
***Oenothera speciosa** Nutt.; see *2*:204 **C**
Olearia sp. W
***Ononis spinosa** L.; see *28*:285 **K**
Ophioglossum petiolatum Hook.; see *16*:56 **R**
Oplismenus imbecillis (R. Br.) Roem. et Schult.; see Vickery, *Flora of N.S.W.* No. 19:217 (1975) **WZ**
***Opuntia cylindrica** DC.; see *28*:400 **G**
***Opuntia robusta** Wendl.; see *28*:400 **ABCFGHMR**
Oreobolus oxycarpus S. T. Blake; see *27*:440 **SW**
Pandorea jasminoides (Lindl.) K. Schumann; see *28*:578 **W**
***Panicum schinzii** Hackel; see L. K. Chippindall in *Grasses & Pastures of South Africa* :334 **CM**
***Paronychia brasiliana** DC.; see *28*:133 & Aston, *Muelleria* 3:209-214 (1977) **NWZ**
Paspalidium constrictum (Domin) C. E. Hubbard; see Vickery, *Flora of N.S.W.* No. 19:144-145 (1975) **AFGL**
***Passiflora edulis** Sims; see *28*:399 **S**
Persoonia mollis R. Br.; see *2*:217 **Z**
Persoonia sp. S
Phebalium sp. aff. diosmeum A. Juss.; see *28*:334 **V**
Phyllanthus australis Hook. f.; see *4*:511 **DJ**
Pimelea sp. DJ
Plantago cunninghamii Decne.; see Briggs, Carolin & Pulley, *Flora of N.S.W.* 181:32 (1977) **ABGM**
Plantago drummondii Decne.; see Briggs, Carolin & Pulley, *Flora of N.S.W.* 181:34 (1977) **ABDEFG**
Plantago euryphylla Briggs, Carolin & Pulley in *Contr. N.S.W. natn. Herb.* 4:396 (1973) **RSV**
Plantago gaudichaudii Barn.; see Briggs, Carolin & Pulley, *Flora of N.S.W.* 181:28 (1977) **DEHJKNT**
Plantago glacialis Briggs, Carolin & Pulley in *Contr. N.S.W. natn. Herb.* 4:395 (1973) **V**
Plantago hispida R. Br.; see Briggs, Carolin & Pulley, *Flora of N.S.W.* 181:24 (1977) **DEJKMPRW**
***Plantago indica** L.; see Todd, *Vict. Nat.* 94:29-30 (1977) **B**
***Plantago myosurus** Lamk.; see Briggs, Carolin & Pulley, *Flora of N.S.W.* 181:10 (1977) **N**
Plantago turrifera Briggs, Carolin & Pulley in *Contr. N.S.W. natn. Herb.* 4:396 (1973) **ABFH**
Poa affinis R. Br.; see Vickery, *Contr. N.S.W. natn. Herb.* 4:187-188 (1970) **WZ**
Poa cheelii J. W. Vickery in *Contr. N.S.W. natn. Herb. 4*:195-197 (1970) **W**
Poa clelandii J. W. Vickery in *Contr. N.S.W. natn. Herb. 4*:193-194 (1970) **BDEJPT**
Poa clivicola J. W. Vickery in *Contr. N.S.W. natn. Herb. 4*:213-214 (1970) **RVWZ**
Poa costiniana J. W. Vickery in *Contr. N.S.W. natn. Herb. 4*:214-217 (1970) **SVWZ**
Poa crassicaudex J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:193-194 (1970) **DH**
Poa ensiformis J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:188-191 (1970) **NRSTVWZ**
Poa fawcettiae J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:232-233 (1970) **DJRSVW**
Poa helmsii J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:205-208 (1970) **RSVWXYZ**
Poa hiemata J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:230-231 (1970) **STV**
Poa hookerii J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:222-223 (1970) **YZ**
Poa hothamensis J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:191-193 (1970) **RSV**
Poa induta J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:236-238 (1970) **DWZ**
***Poa infirma** Kunth.; see Gray, *Contr. Herb. Aust.* No. 6:2-3 (1974) **N**
Poa labillardieri Steud.; see Vickery, *Contr. N.S.W. natn. Herb. 4*:199-205 (1970) **CDEJKMNPRSTV WXZ**
Poa meionectes J. W. Vickery in *Contr. N.S.W. natn. Herb.* 5:250 (1972) **Z**
Poa morrisii J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:239-241 (1970) **CDEJKMNPRTVWZ**
?*Poa nemoralis L.; see Vickery, *Contr. N.S.W. Herb.* 4:244 (1970) & *27*:100 **W**
Poa petrophila J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:238-239 (1970) **SWZ**
Poa phillipsiana J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:220-222 (1970) **RSVWZ**
Poa rodwayi J. W. Vickery in *Contr. N.S.W. natn. Herb.* 4:235-236 (1970) **EN**
Poa sieberana Spreng.; see Vickery, *Contr. N.S.W. natn. Herb. 4*:223-229 (1970) **BCDEHJKMNPRST VWXYZ**
Poa sp. Z
***Polygala virgata** Thumb.; in *Prod. Pl. Cap.* 120 **E**
Polyscias murrayii; (F. Muell.) Harms; see *2*:391 & *28*:476 the latter as *Tieghemopanax murrayi* (F. Muell.) Viguier **Z**
Pomaderris obcordata Fenzl.; see *28*:361 **CD**
Pomaderris sp. aff. velutina J. H. Willis **STWZ**
Pratia sp. aff. purpurascens (R. Br.) F. E. Wimmer; see *28*:631 **DEK**
Prostanthera rhombea R. Br.; see *2*:516 **S**
Prostanthera sp. aff. howelliae Blakely **ST**
Prostanthera sp. aff. linearis R. Br. **T**
Prostanthera sp. aff. melissifolia F. Muell. **Z**
Prostanthera sp. aff. rhombea R. Br. **S**
Prostanthera sp. aff. rotundifolia R. Br. **S**
Prostanthera sp. aff. walteri F. Muell. **R**
Pterostylis aestiva D. L. Jones *Muelleria* 2:151 (1972) **VW**

Pterostylis coccinea R. D. FitzG., see 22:87 **W**
Pterostylis laxa J. A. P. Blackmore, *Orchadian* 3:2 (1968) **VWYZ**
Pterostylis sp. (A) V
Pterostylis sp. (B) B
Pultenaea paludosa J. Thompson, see Cornick, *Vict. Nat.* 94:151 (1977) **Z**
Ranunculus scapiger Hook., see *28*:150 **SVWZ**
Ranunculus undosus Melville in *Kew Bull.* 211 (1955) **CG**
Ranunculus victoriensis B. G. Briggs; see *28*:148 **SVW**
***Robinia pseudoacacia** L.; see *28*:306 (The author has seen this spreading along the Wonnangatta River) **S**
***Romulea minutiflora** Klatt, see *13*:72 **J**
Rorippa eustylis (F. Muell.) Johnson in *Contr. N.S.W. natn. Herb.* 3:97 (1962) **AEG**
***Rorippa microphylla** (Boenningh. ex Reichb.) Hylander ex A. & D. Love; see *28*:182-183 and *1*:35 (both as **Nasturtium microphyllum* Boenn. ex Reichenb.) **DESWZ**
***Rubus vestitus** Weihe & Nees ex Bluff & Fingerh; see Amor & Miles, *Muelleria* 3:56-57 (1974) & *28*:205 **KV**
Rumex tenax Rech. f.; see 2:183 **CHL**
***Sagittaria engelmanniana** J. G. Sm.; see *27*:75 (as **S. sagittifolia* L.) & *1*:182-183 **M**
***Sagittaria graminea** Michx.; see *1*.183-185 **R**
***Saxifraga stolonifera** Meerb.; see *28*:194 (the author has seen this spreading in the Byaduk Caves) **D**
***Scandix pecten-veneris** L.; see *28*:487 **N**
Schoenus deformis Poir; see *3*:151 **E**
Scirpus habrus Edgar in *N.Z. J Bot.* 4:199 (1966) **CJSVWZ**
***Senecio pterophorus** DC.; see *6*:885 & *28*:755 **DE**
Senecio sp. aff. apargiaefolius Walp. **ABDEJNSW**
***Solanum gracilipes** Herter; see Henderson, *Contr. Qd Herb.* No. 16:46 (1974) **NW**
Solanum linearifolium I. F. Berasimenko, see *28*:550 **KTVWYZ**
Solanum opacum A. Br. & Bouche; see Henderson, *Contr. Qd. Herb.* No. 16:39 (1974) **AKNPSWZ**
Sonchus hydrophilus Boulos; see *13*:331-332 & *28*:773 **BCDEGK**
Sporobolus creber J. De Nardi in *Contr. N.S.W. natn. Herb.* 4:406 (1973) **M**
Stackhousia aspericocca Schuch.; see Barker, *J. Adelaide Bot. Gard.* 1:71-75 (1977) **CD**
Stipa spp. (Under revision by J. W. Vickery)
***Suaeda sp.** aff. **linifolia** Pall. **A**
Suaeda sp.; see *28*:112 **N**
Swainsona luteola F. Muell., see Lee, *Contr. N.S.W. natn. Herb.* 1:244 (1948) **A**
Symplocos cochinchinensis (Laur.) Moore; see *23*:159 **W**
***Tamarix sp.** (spreading in various places) **BD**
Tetrarrhena sp.; see *27*:91 **DJRWZ**
Tetratheca thymifolia Sm.; see J. Thompson, *Telopea* 3:200-203 (1976) **W or Z**
Thelymitra holmesii W. H. Nicholls in *Vict. Nat.* 49:263 (1933); see *27*:347, and *22*:5 (both as T. pauciflora R. Br. var. holmesii (W. H. Nicholls) W. H. Nicholls) **DEKP**
Thelymitra mucida R. D. FitzG.; see *27*:446 **DEP**
Thelymitra sp. Z
Tmesipteris elongata Dang.; see Chinnock, *N.Z. J Bot.* 13:761-764 (1975) **KT**
***Trifolium squamosum** L.; see *28*:296 (the author has seen this spreading at Codrington) **E**
***Tropaeolum majus** L.; see *13*:201 **KNP**
Uncinia compacta R. Br. in *8*:241 **SV**
Uncinia sp. aff. tenella R. Br. **S**
***Urochloa panicoides** Pal. Beauv; see *27*:207 (the author has seen this spreading at Annuello) **F**
Utricularia sp. (A) (Royal purple flowers with about seven yellow stripes at base of apron) **CDK**
Utricularia sp. (B) W
***Verbascum sp. C**
Veronica sp. aff. **gracilis** R. Br.; see *28*:570 **DENR SVWZ**
Viola sp. aff. hederacea Labill. **DE**
Vittadinia sp. ABEG
***Vulpia muralis** (Kunth) Nees; see Stace & Cotton, *Watsonia* 11:257 (1977). Determinations by P. S. Cocks. **ABCJMNR**
Wahlenbergia sp. (A) BGHJMNRW
Wahlenbergia sp. (B) CDKNUW
***Watsonia pyramidata** (Andr.) Klatt, see *27*:342 **N**
Wolffia globosa (Roxb) Hartog & Plas.; see *1*:256 **M**
Xanthosia leiophylla Klatt ex F. Muell. in *Linnaea* 29:710 (1857-1858) **DEK**
Zieria robusta Maiden & Betche; see Blakely in *Contr. N.S.W. natn. Herb.* 1:123 (1941) **S**
Zieria sp. CD
Zygophyllum eremaeum (Diels) Ostenf. in *Biol. Meddr.* 3:76 (1921) **ABF**
Zygophyllum sp. aff. **billardieri** DC. **AF**
Zygophyllum sp. aff. glaucum F. Muell. **AFG**
?*Genus (Family **POLYGALACEAE**) **D**

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ERRATA FROM PART 1

Agropyron pectinatum (Labill.) Pal. Beauv.
***Alhagi pseudalhagi**
Atriplex inflata . . . A. lindleyi Moq.
***Bromus hordeaceus**
***Carduus pycnocephalus**
***Cenchrus longispinus**
***Centaurium tenuiflorum** (Hoffm. et Link) Fritsch
Danthonia paradoxa R. Br.: **Plinthanthesis**
Desmazeria* . . . ***Plagiochloa
Diuris fastidiosa . . . D. pedunculata
Haloragis racemosa . . . **Haloragodendron baeuerlenii**
Juncus krausii
Kochia erioclada
Kochia excavata,
C *Kochia georgei* Diels: **Maireana turbinata**
Lithospermum* . . . ***Buglossoides
*Malus sylvestris (L.) Mill.
Picris* . . . ***Helminthotheca
Tetratheca labillardierei

The information source for the *Scirpus hamulosus* and S. lateriflorus entries is K. Wilson, NSW.
See also Adansonia, ser. 2, 6(4) 1967 and 16(1) 1976.

F.N.C.V. Submission on the Proposed Recommendations of the Alpine Area.

The F.N.C.V. rejects the L.C.S.'s proposed recommendations on the Alpine Study area believing that they do not go far enough in protecting the natural environment from slow deterioration.

We believe that only a National Park, as proposed by the V.N.P.A., offers the required qualities in the Alps, and at the same time providing for the widest range of recreational activities compatible with nature conservation.

The L.C.C.'s stated reason for not having an Alpine National Park was that logging should continue, however we believe that sufficient hardwood resources are available for Victoria's needs outside the proposed National Park area. We also agree with the L.C.C. that unemployment could arise in the timber industry whether or not logging is to continue throughout the study area and therefore do not feel that this fact should prevent an Alpine National Park, with its attendant employment opportunities, from being established.

We believe that grazing should be phased out of the Alpine area, in general, and stopped as soon as possible in sensitive areas such as alpine herbfields, grassland and sphagnum bogs.

The F.N.C.V. supports the National Park additions of Tingaringy and Snowy River, and support the Avon Wilderness so far, although we think it should be much larger so as to adequately fulfil wilderness requirements.

The management control of off road vehicles are not strong enough to prevent harassment of other users and environmental damage.

Easter in the Otways

Speculation about Unusual Phenomena

By C. H. Henshaw*

To the writer, a latecomer to the fascinating world of botany, it is a matter of frequent regret that it was not studied in early life. On a trip such as the F.N.C.V. excursion to Apollo Bay at Easter 1978, the absence of an early grounding in the subject can lead to speculation which may be based on false assumptions.

For instance, we noticed at Angahook Forest Park behind Mogg's Creek a dead grey tree stump, minus bark, at least 24" (60 cm) in diameter, cut off about 4' (1.2 m) from the ground. Above this stump rose four stems of *Eucalyptus sideroxylon* (Red Ironbark) each about 6" in diameter. These had not sprung from the stump, but had coppiced from lignotubers or epicormic buds close to ground level, roughly at each "corner". The living tissue of the four stems was now joining up, having moved across the dead stump in the way that bark grows over the scar left by an axe slash. In fact, only four triangular sections and part of the top of the stump remained uncovered.

In the ensuing discussions, doubt was expressed as to whether the stump could be ironbark, surely they didn't grow that thick; perhaps ironbark seedlings had grown against the stump of another species and gradually the bark had formed over it! However, reference books consulted later, stated that *sideroxylon* may have a diameter up to 5' (inconclusive, because those on the poor-looking soil supporting the Airey's Inlet population may not necessarily have been as massive as that); and the species coppices freely.

This matter of trees wrapping themselves around others reminded us of a somewhat similar phenomena seen earlier at a picnic spot called Paradise, about 7 km (4½ miles) from Apollo Bay on the East Branch of the Barham River. The locality is given the alternative name of Stanley Glen on an early (1946) map while another simply prints the word "Fernery".

At Melba Gully, Mait's Rest and Grey River Reserves we had seen the Soft Tree Fern *Dicksonia antarctica*, a few Rough Tree Ferns *Cyathea australis* and a distant sighting of what may have been two Skirted Tree Ferns *Cyathea marcescens*. Jones and Clemesha[1] consider this rare species to be a hybrid between C. australis and C. cunninghamii (Slender Tree Fern) among which it is always found growing. Dicksonia is the predominant growth in the lush tangle of rain forest clothing lower slopes of the steep vee-shaped valleys. The largest specimens grow practically in the stream so that floods and the fight for light had resulted in the massive trunks leaning at odd angles — sometimes against each other, forming arches and inclined planes, but actual grafting was not seen. The Dicksonia in such situations is often host for a number of epiphytes including filmy ferns, fork ferns, orchids and mosses.

At Barham Paradise, the "Fernery" was on a relatively flat flood plain, and the most interesting portion of it consisted of a pure stand of the Soft Tree Fern with thick straight trunks about 10 m high and spaced some four to eight metres apart, in an area perhaps 40 m square, sufficiently small to enjoy the protection of the canopy of the magnificent eucalypts in the vicinity — thought by us to be *globulus, viminalis* and/or *ovata* — towering fifty metres above. The floor of this section was carpeted with leaf mould, largely from *Nothofagus cunninghami* (Myrtle Beech) and it needed very little poetry in one's soul to imagine the trunks as the columns and the arching fronds the roof of a perfect, natural cathedral.

*4 Pelling Road,
Murrumbeena, 3163.

Note 1. "Australian Ferns and Fern Allies" by D.L. Jones & S.C. Clemesha. A.H. & A.W. Reed Pty. Ltd., 1976, p. 59.

On the outskirts of this pure stand, the tree ferns were mixed with tall slim *Acacia melanoxylons* (Blackwoods) and *Nothofagus* and there was a scattered understorey of low-growing ferns and occasional spindly shrubs.

In referring to the tree ferns as being mixed with the trees, interspersed would perhaps be the more accurate word in most cases. However, there were about a dozen more intimate mixtures — in fact tree and fern were inextricably linked together. In one case it seemed that the beech tree had, at about 2 m above the ground, sprouted a thick branch of fern trunk with fronds — a most odd-looking effect. In others, stripling beeches or blackwoods seemed to issue from the fern trunks and to soar upwards from the parent plant. There was another patch of three or four joined doublets in a cleared pasture of river flat some 500 m upstream, presumably spared as an oddity.

Having even less knowledge of ferns than other families of plants, the writer can only speculate as to the cause of this phenomena which surely is seen elsewhere rarely, at least not as prolifically as here. It is suggested that, despite differing appearances, in all cases the fern was present first and became host to a seedling beech or blackwood which subsequently sent a rootlet down along the fern trunk to the ground somewhat after the manner of the strangler fig of the northern rain forests.

In time this has developed and partially or completely surrounded the fern trunk without apparent harm to the host, in contrast to the fatal embrace of the fig.

In considering the cause of this phenomena and the reason for it not being seen extensively elsewhere, it is tempting to think that the geographical differences between Barham Paradise and the other areas, may have a bearing on the puzzle. The flood plain of the Barham at Paradise is situated some three to five metres above the level of the river when we saw it. In this high rainfall area it probably is inundated several times each winter with a rich deposit of silt each time.

However the other three gullies also are rich in humus and are perpetually moist. Both environments appear to have a high humidity and it seems that a more detailed study would be necessary before any sound conclusions could be reached about the cause of the phenomena.

While on the subject of odd fern growth, I will conclude with reference to a trunk of *Dicksonia* flat along the ground, half buried, for three or four metres. At the growing end, green fronds were shooting at right angles, commencing again the long job of erecting a tall vertical trunk.

Having in mind, on the one hand, the enormous amount of seed produced by many plants (Eucalypts, callistemon, for example); and on the other hand, the large quantity of seeds eaten or spoiled by insects, and the further loss of young seedlings by virus and fungal infections, or as fodder for animals (from snails to kangaroos) one authority concludes that in the plant world, death is the norm, and life, attaining maturity, the rare exception. This being so, the present writer never ceases to be amazed at the resilience and formidable will to live shown by some species (these persistent tree ferns, for example) compared with the fragility and temperamental capriciousness of the native species he tries to raise from seed or cutting in his suburban bush plot.

Geology of Mt Buffalo

FNCV Excursion, January 1978

By Frank Robins

This has been described fairly well in an excellent little booklet available at Mt. Buffalo information centre — $2 — by Sue and John Brownlee, *Mt. Buffalo National Park*.

Mt. Buffalo is a granite mass or pluton in the form of a gigantic plateau projecting about 1000ft. (300 metres) or more above the surrounding sedimentary sandstones and shales of Ordovician age. The top forms an elongated plateau some 7 miles (11 km) long by about 4 miles (1.6 km) wide with a narrow N. Buffalo section at the N. end. The highest point is called The Horn (5645 feet — 1721 metres above sea level). No radiometric age has been published, but it is stated to be of similar type to the Pilot Range granite further north near Beechworth which is dated at about 365 million years in the Devonian Age.

The granite is coarsely crystalline consisting largely of quartz crystals (glassy appearance), feldspar crystals (plagioclase and orthoclase — milky white colour) and mica (biotise-black). Also hornblende (black crystals). I noticed a rather attractive pink crystalline granite near the Reservoir on Crystal Brook. It is usually assumed that granite was molten rock which cooled and crystallized very slowly, while deeply embedded in older sedimentary rock perhaps one or more miles (or kilometres) below the surface. It is not believed this molten rock forced its way up by displacing the overlying rock, but more like a combination of pressure and heat from below melting the overlying sedimentary rock, which on cooling and recrystallizing slowly became granite. Maybe convection currents in the molten rock facilitated the upward flow of heat, as we now see in our plate tectonic theory. From this, it follows that the older sedimentary rock 400 million years ago extended right up several miles (or km) above the present plateau, and erosion has removed this sedimentary rock since then leaving the granite now standing higher than the surrounding sedimentary rock which can be seen along the road for quite a distance as we climb up past the Eurobin Creek crossing. The junction of the granite and Ordovician sediments can be seen on the road just before the old 11-mile peg (17.7 km), but motorists don't stop at such places.

Whatever the explanation of the granite, etc., bathyliths (over 160 of them outcropping in Victoria — not all Devonian in age — ages between 350 m.y. and 475 m.y.), they all exhibit features typical of granite country. They are (a) existence of great rounded blocks or tors, (b) a system of joint planes in 3 directions more or less at right angles, one of them being horizontal, (c) deep weathering or kaolinization hidden below the surface in open spaces where no rocks outcrop.

(1) Jointing and stream pattern — the Mt. Buffalo joint system is two sets of vertical joints running NE-SW and NW-SE plus a horizontal set. This tends to make the granite naturally split up into rectangular blocks, and the stream pattern is roughly controlled by these weaknesses. The Brownlees' booklet shows this well (p.17) especially for Crystal Brook, Eurobin Creek, Bunyip Creek and the precipitous sides of Mt. Buffalo. The origin of the joints would at least partly be due to contraction during cooling, and also due perhaps to additional shearing stresses. Otherwise it would be difficult to explain the NE-SW and NW-SE directions at Mt. Buffalo.

(2) The rounded tors — are simply explained by chemical and physical weathering caused by penetration of ground water containing oxygen, carbon dioxide (an acid gas), nitrogen oxides (acid gases), plant chemicals etc. down along these cracks or joints, and decomposing the minerals.

Quartz crystals do not decompose so they become quartz sand later. The feldspar crystals decompose into a white clay (kaolin) and the mica and hornblende and other ferromagnesium minerals decompose giving red clays due to iron chiefly. Gradually the rectangular blocks between the joint planes would by attack from all six faces would become rounder and rounder especially along the 8 edges. This would happen mostly during subsurface weathering, as I once showed this club in an excursion to the "Pink Cliffs" at Heathcote, where rounded weathered tors were still embedded in soft completely kaolinized granite. Gradually, rain water removes the soft weathered granite and exposes the rounded blocks or tors. The size of the tors depends a lot on the original spacing of the joints — big tors — distant joints — little tors — close joints. The joint pattern is still visible today, e.g. in the Wool-pack, the Cathedral, etc.

After exposure, a new set of features arises — alternate heat and cold, wet and dry further opens up cracks for water to penetrate, and also a deposition of silica on the surface may harden the surface and prevent further weathering. In addition, the intense temperature differences of the surface causes another type of splitting off of slabs parallel to the surface called exfoliation weathering (onion skin weathering) often seen on tors.

The wonderful gorge formed by the Crystal Brook is also explained by a jointing feature. The NE-SW joints are close together and continue vertically a great distance, this increases the weathering in this area, so that great thin slabs of granite become removed in time with the help of the waters of Crystal Brook.

Another feature of granite is the darker colour on the surface than below in the undecomposed interior. The colour is not the colour of decomposed granite — it is the colour of living plants — primitive lichens — a combination of algae and fungi living in co-operation on rock and helping to break it down. The lichens are sensitive to extreme small concentrations of metals like lead, zinc, copper. Below a brass plaque near the Chalet, a white surface shows where all algae have died through rain water trickling from the brass plate over the granite surface. Similar white stripes appear below galvanized pipes set into the granite with lead plugs. We were told that the lead plugs had been covered with plastic to stop this white streak developing. Yet we humans have been drinking rainwater from galvanized roof and tanks for over 100 years without anyone complaining.

Amy Fuller

Amy Fuller (1869-1944) was one of four sisters, all of whom were accomplished musicians or artists. Amy was born in Geelong and, apart from her overseas travels and a short period of residence in Western Australia, she lived most of her life in Melbourne. She was elected to membership of the Field Naturalists' Club of Victoria in 1914 and was an active member for about ten years. **She bequeathed a collection of her water colour paintings to the Club** (see front cover) and these have been exhibited many times at shows and Club meetings.

As well as flowers from Victoria and New South Wales she painted in Western Australia and in Africa, where she spent some time in Cape Town visiting relatives. In 1914, during a visit to London, she sold 102 of her paintings of the more uncommon African plants to the Kew Herbarium.

Amy Fuller read a paper to the Club in June 1914 entitled "Some African Scenes and Flowers" which was later published. (See Vict. Nat. 32:57-64 (1915)). A brief biography by J. H. Willis appeared in 1958. (Vict. Nat. 74:147-50 (1958)). MC

Australian Natural History Medallionist for 1978 — Allan Roy Sefton

The Award Committee has announced that the Australian Natural History Medallion for 1978 has been won by Allan Roy Sefton. Once again this coveted award has gone to an amateur naturalist who has earned a nationwide reputation in ornithology and conservation, but who has extended his range of activities into other branches of natural history and fields of citizenship.

It is noteworthy that he has been employed for over 40 years as an electrical engineering draughtsman with Australian Iron and Steel Pty. Ltd. (B.H.P.), and has played an important part in advising the directors of their Wollongong-Port Kembla industrial complex in the preservation wherever possible of the natural environment and the minimization of air pollution in the area. Another example of this useful 'watchdog' advisory service is Harry Butler, noted naturalist of television documentaries, an employee of W.A. Petroleum Company, Barrow Island, Western Australia.

Allan Roy Sefton

Allan Sefton was born in Hobart, Tasmania, on 4 May 1921, and after short periods of residence in Adelaide (Unley) and Melbourne (Kew), spent the rest of his childhood at Thirroul, the home for many years of his parents and, indeed, of his grandparents and, on his mother's side, even of his great-grandparents. He attended in turn Thirroul Primary School, Wollongong Junior Technical School (now Keira Boys' High School) and Wollongong Technical College, qualifying in the engineering discipline that has provided him with his living ever since.

He was first nominated for the Medallion in 1973 by Illawarra Natural History Society, of which he was president for seven consecutive terms and is an honorary life member. He was re-nominated by the club in 1976, and supported by Goulburn Field Naturalist Society. He is regional representative of the R.A.O.U., NSW, and a participant for 14 years in the bird-banding scheme of CSIRO Division of Wildlife Research. He has been awarded life memberships of the Royal Zoological Society of NSW, and of the David G. Stead Memorial Wildlife Research Foundation of Australia. He is an active member of the NSW Field Ornithologists' Club, the Bird Banders' Association of Australia, the South Coast Conservation Society, and the Ornithological Society of New Zealand.

In the field of conservation, he has been chairman of Five Islands Nature Reserve Committee of Management since its inception in 1960, and for 15 years before that led the crusade to have this set apart for breeding sea-birds. The NSW Government and Wollongong City Council owe a lot to the logic and foresight of Allan Sefton, who has made a major contribution to the study and preservation of Australian fauna and flora. He has actively participated in all conservation issues for over 30 years, a few examples being Lake Pedder, Clutha, Myall Lakes, Colong Caves and Bungonia Gorge issues, and, nearer to home, aid to distressed and injured native fauna, the planned Illawarra Escarpment Regional Park, opposition to a proposed casino complex on a flood-plain (still a haven for water-birds) on the shore of Lake Illawarra, and pollution problems at Port Kembla of fish-kills and the proposed coal-loader.

With J. D. Gibson, he conceived the idea of and helped form and supervise the operations of

the NSW Albatross Study Group. He has continually patrolled Illawarra beaches since 1950, and the Royal Albatross, Buller's Albatross, Westland Black Petrel and Georgian Diving Petrel were first collected in Australia on Wollongong beaches. The Illawarra Bird-list of 314 species is an impressive one — compiled and kept up to date by Mr. Sefton. He completed the ornithological section of the Biological Survey of the Illawarra District for the Illawarra Natural History Society (a huge card index housed in the Central Municipal Library and endorsed by Wollongong City Council), and greatly assisted with the arachnid and herpetological sections.

Allan Sefton has given countless talks to various local groups, including schools, illustrated by his own photographic slides. Migrant families constitute half the population in Wollongong, and he has been assiduous in educating them in the need for preserving our Australian environment and encouraging them to play an active part in conservation. Recent controversies such as the wood chip industry, air pollution, the uranium issue, and 'Save the Whale' are cases in point.

He is currently working on 'The Birds of the County of Camden', to be published in 'Birds', the official organ of the Field Ornithologists' Club of NSW. He has contributed many papers to 'Emu' (RAOU) and innumerable articles in 'I.N.H.S. Circular' (newsletter of Illawarra Natural History Society). In addition, many of his articles have appeared in 'B.H.P. Review', 'A.I.S. Safety News', 'Gould League Notes', 'Australian Bird Watcher', 'Kunggurra News', 'Wildlife Research News', 'Illawarra Daily Mercury', 'Kembla News', and in 'Walkabout' magazine he had a contribution entitled 'Albatrosses of Southern Coastal NSW'. An article on 'The Australian Bird Banding Scheme' appeared in 'Justice of the Peace', organ of the NSW Justices' Association (he has been a J.P. for many years).

In 1975 Allan Sefton's name appeared in the Queen's Birthday honours list as the recipient of a British Empire Medal (B.E.M.), for 'services to the community, as a natural historian, ecologist, conservationist and ornithologist'. Among his other interests has been sport — he is a member of 45 years' standing and a life member of Thirroul District Cricket Club, and has been a trustee of his church for more than 25 years. He married Dorothy Green of Thirroul in 1943, and they have four sons and a daughter. His address is 15 Station Street, Thirroul, NSW 2515.

J. A. Baines

Field Naturalists Club of Victoria

Reports of FNCV Activities

General Meeting
Monday, 14 August, 1978

Dr P. Keane, Lecturer in Botany, La Trobe University gave a very interesting address on 'Fungi in the Environment'. Using a series of slides he spoke on the diversity of fungi and their role in nature. Because fungi must absorb carbohydrate from their surroundings as they cannot produce it by photosynthesis, they absorb it from dead organic matter, such as leaf litter and rotting wood, or from living organisms. The latter forms either a parasitic symbiosis where the fungi benefit, but the host, generally a plant, suffers; or a mutualistic symbiosis, where both the fungus and the plant benefit. Many native species of plant depend upon this symbiosis. The mycelium attach themselves to the plant roots, changing the

cell structure, allowing access to greater amounts of nutrients, especially phosphates. This results in healthier plant growth. The fungus benefits by obtaining nutrients from the plant host. Some orchids obtain carbohydrate from mycelium especially during their early growth stages before they have developed leaves. Lichens are composed of a fungus and algae living together in symbiotic union — the fungus derives carbohydrate from the algae host which obtains water from the fungus.

Exhibits. Displayed under the microscope were plant sections shown under both polarized light and ordinary light; and a pamphlet on 'The Microscope' put out by the Microscopy Group.

A Note

On Saturday 19th August several members of the FNCV and a group of Hawthorn JFN attended the wedding of Barry Cooper and his bride Marguerite (Maggie) Anamian.

On 22nd August Barry and Maggie left to spend 10 months in Canada where Barry has a temporary position as Assistant Professor at Waterloo University, Toronto to continue with his work on Conodonts.

Members of the FNCV would like to wish them both congratulations and every success in their future together.

S.L.B.

General Meeting
Monday 11 September 1978

In his address "Natural history writing" Mr Ken Simpson spoke of several writing projects he has on hand. As a lecturer in the Science Department of Burwood State College he sees the need for a book on this, that or the other and, it seems, goes into action to meet that particular need. An explosion in publications on birds led him to start "Bird books for Birdoes" in which some 200 bird books have been divided into 28 categories and each evaluated. It will be available soon.

Another large project is "Australian Wildlife Review". Ken Simpson and Tony Robinson are preparing a short account of creatures in Australia — every species of mammal, birds, fish, reptiles and amphibia. Mr Simpson wished he could have a year free from work (free from his regular bread-winning work) in order to finish the job.

"Birds of Groote Island" is in progress — commissioned by BHP, and environmental impacts are being worked into a story about a mud-daubing wasp that has forgotten how to mud-daub!

Exhibits consisted only of a superb flowering specimen of *Eucalyptus caesia*, and some pressed plants gathered near Mount Tom Price, WA.

Positions Vacant

Secretary. Mr Garnet Johnson is going on an extended holiday and has resigned from the position as FNCV Secretary and chairman of our Kinglake property. Garnet has given good service to this Club and has made valuable contributions to Kinglake.

The Secretary's job is not as heavy as generally imagined. Stacks of correspondence are received and need to be filed, but there is not so much outward correspondence and some of it can be undertaken by other Council Members. One night per week would probably cover the work.

Editor. Mr Reuben Kent is emphatic that he will not continue as editor beyond his original commitment for two years. December will be his last issue. Reuben has done a great job and we seek another volunteer for one or two years.

Almost all our editors have been amateurs and previous experience is not necessary although it's certainly easier. Reuben will help the incoming Editor and the printer is always ready to advise on technical matters. The editor's job is very demanding but it's also very interesting.

New Club Diarist for the Naturalist

Our new FNCV Diarist is Mr Alison Oates. If you want your material to be in a particular issue, it must be with our Diarist **before the 7th of the preceding month.** Simply post it to Mrs Oates
c/o National Museum Victoria
285-321 Russell Street, Melbourne,
or phone 663 4811 Ext. 346.

(Continued from page 170)

GROUP MEETINGS

All FNCV members are invited to attend any Group Meeting, no extra payment
At the National Herbarium, The Domain, South Yarra at 8.00 p.m.

First Wednesday in the Month — Geology Group

Wednesday, 4 October. "Mining costs today — feasibility." Mr Graeme Love.
Wednesday, 1 November. "Underwater mining of Manganese modules." Mr K. Han of Monash University.
Wednesday, 6 December. Members' Christmas party.

Third Wednesday in the Month — Microscopy Group

Wednesday, 18 October. Photography through the microscope — black and white, colour, movies. ½ hour member's colour slides.
Wednesday, 15 November. To be announced at Group meeting.

Second Thursday in the Month — Botany Group

Thursday, 12 October. "Ranunculaceae family" Miss Madge Lester
"Mosses". Cameron McConchie.
Thursday, 19 November. Illustrated talk on the Benalla area by members of the group.
Thursday, 14 December. Annual General Meeting. Flowers to observe in December. Please bring specimens, slides or illustrations.

At the Conference Room, The Museum, Melbourne at 8.00 p.m.
Good parking area — enter from LaTrobe Street

First Monday in the Month — Marine Biology and Entomology Group

Monday, 2 October. Members' night.
Monday, 6 November. To be announced at Group meeting.

At the Arthur Rylah Institute, Brown St., Heidelberg at 8.00 p.m.

First Thursday in the Month — Mammal Survey Group

Thursday, 5 October, Thursday, 2 November, Thursday, 7 December.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions

Botany Group

Thursday, 28 September — Sunday, 1 October. Visit to Benalla FNC. Other FN welcome to join us.
Saturday, 28 October. Gisborne to Bacchus Marsh. Leader: Mrs Hilary Weatherhead.
Saturday, 25 November. Dom Dom Saddle.

Day Group — Third Thursday in the month

Thursday, 19 October. Tour of Melbourne ports. Book with Mrs Gillespie. Phone 578 1879.
Thursday, 16 November. Maranoa Gardens. Meet at entrance in Beckett Park at 11.30 a.m. Take Mont Albert tram (No. 42) in Collins St., alight at Kireep Rd.

Geology Group

Excursions of the Geology Group will be announced at Group meeting.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora
Members include beginners as well as experienced naturalists

Patron:
His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

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Group Secretaries

Botany Mr CAMERON McCONCHIE, 158 Warrandyte Road, Ringwood, 3134 (870 9986)
Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127 (89 2850)
Geology: Mr. T. SAULT, c/o National Herbarium, Birdwood Avenue, Melbourne, 3004
Mammal Survey: Mr. MICHAEL HOWES, 10 Palmer Street, Fitzroy, 3065
Microscopical: Mr. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268)
Entomology and Marine Biology. C/o National Herbarium, Birdwood Avenue, Melbourne, 3004
FNCV Kinglake Nature Reserve: McMahons Road, Kinglake *Bookings and Keys.* C/o Chairman, GARNET JOHNSON, 20 Sydare Avenue, Chadstone, 3148 (56 3227)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine

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the victorian naturalist

Vol. 95, No. 6 November/December, 1978

SPECIAL ALPINE ISSUE

Published by the
FIELD NATURALISTS CLUB OF VICTORIA
in which is incorporated the Microscopical Society of Victoria

$1·20

Registered for posting as a publication – Category "B"

GENERAL MEETINGS

At the National Herbarium, The Domain, South Yarra

Monday, 11 December, 8.00 p.m.
Speaker: Dr. J. Nelson, Senior Lecturer in Zoology, Monash University. Subject: Arnhem Land Mammals.

Monday, 8 January, 7.55 p.m.
Extraordinary General Meeting. Business: Election of the Black Rock Field Naturalist's Club as an affiliated club.

Monday, 8 January, 8.00 p.m.
Members Night. Members who wish to speak or show slides should contact either the President or Secretary.

Monday, 12 February, 8.00 p.m.
Speaker: Mr. R. Miller, President of the Archaeological Society of Victoria. Subject: Historical Archaeology in Victoria.

New Members—November General Meeting. No new members.

New Members—December General Meeting.

Ordinary:
M/s Kathleen Nolan, Mt. St. Josephs College, 133 Maidstone St., Altona West, Vic. 3018.
Mr M. Kitchell, 3 Lebanon St., Strathmore, Vic. 3041.
Miss Julie Moon, 4 Hillside Ave., Bentleigh, Vic. 3084. Mammal Survey & Botany.
Mr Lew Kent, 32 Crampton Cres., Rosanna, Vic. 3084. Arachnology.
Miss Vivienne Turner, 6 Una St., Mt. Waverley, Vic. 3149.
Dr Conrad Serina, C/- Division Of Wildlife Research, C.S.I.R.O. Botany.

Country:
Mrs H. V. Harvey, Box 92, Nyah West, Vic. 3595.
Mr J. M. Pisana, Ferndale Via Warragul, Vic. 3820. Mammals & Survey.
G. Lofthouse, C/- Botanic Gardens, Canberra, A.C.T. 2601.
Mr K. Green, 3-1 Student Residence, C.C.A.E. Belconnen, A.C.T. 2616.
Mr P. Hornsby, Dept. Of Psychology, University Of Adelaide, G.P.O Box 498, S.A. 5001. Animal Behaviour.

Junior:
Master Linton Peters, 17 Larne Ave., Donvale, Vic. 3111.

FNCV EXCURSIONS

Saturday, 30 December—Sunday, 7 January. Bundanoon, N.S.W. Details are in the last Naturalist but if further information is required, contact the excursion secretary.

Sunday, 21 January. Seawinds, Mornington Peninsula. The coach will leave Batman Avenue at 9.30 a.m. Fare $5.50. Bring one meal and a snack.

Sunday, 18 February. Details of this excursion will be in the next Naturalist, but tentatively, it will be Churchill Island. The coach will leave from Batman Avenue at 9.30 a.m.

March, 10—12, Labour Day weekend. This year the FNCV will be hosts for the combined weekend of the Victorian Field Naturalist Clubs Association. There will be an afternoon excursion on Saturday, a full day excursion on Sunday and a short excursion on Monday morning. There will also be meetings on Saturday and Sunday evenings. These excursions and meeting will replace the March general excursion and the March meeting. Will members try to keep this weekend free to meet the country clubs and join in the weekend activities. Details of the programme will appear in the next Naturalist.

(Continued on page 255)

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Cover illustration: *Burramys parvus*—The Mountain Pigmy Possum: Living fossil. Photo by courtesy "The Age".

Mammals of the Australian Alps—a brief review of past work, with a view to the future

BY JOAN M. DIXON*

Since the early explorers Hume and Hovell skirted the Alps in 1824, thus opening up a vast new territory which was soon used for grazing activities, there has been increasing interest in this unique area of Australia. It was subsequently investigated for mining, logging and more recently for recreational activities such as skiing and bush walking. Unlike the coastal areas where faunal collection was an integral part of exploration, and other districts intensively surveyed in the pioneering days, for example, the River Murray with the wide variety of natural history material collected by Major Mitchell's expedition, few reports were made on the Alpine flora and fauna.

In this article I am arbitrarily limiting the confines of the Alps to the Great Dividing Range, generally considering areas above 4500 feet where there is plentiful winter snow. Both Victorian and New South Wales parts of the Divide are included—the latter usually referred to as the Kosciusko National Park. When I refer to true alpine mammals, I will indicate which species are known from above the tree line, a criterion which delineates this area from the lower vegetation zones. In Victoria, the Alpine zones above 4500 feet cover about 870 sq. mi. and in N.S.W. and the A.C.T. 1140 sq. mi.

This article refers mainly to the Victorian situation, but continuity with the range in New South Wales and the similarities of the fauna are important and do not place the Victorian Alps in a unique situation.

*Curator of Mammals, National Museum of Victoria.

Interest in the botanical aspects of the Alps was intensive in the 1950's, significant work being done by Carr and Turner (1959), Carr (1962) and Costin (1957 a, b; 1958). In the 1960s ecology became a field of wide interest, and was rapidly overtaken by a surge in involvement in the environment by the public as well as the academic. Survey work has become fashionable in even more recent times, and is only now reaching a level of sophistication. The first mammal survey of parts of the Victorian Alps was carried out by Brazenor (1947) with investigations into the fauna of the Snowy River area. He recorded a number of mammal species, most interesting of which was the brush-tailed wallaby, *Petrogale penicillata* found in mountainous parts of the Suggan Buggan district. Another of Brazenor's contributions in the Alpine region were his comments on Leadbeater's possum, a species which had been discovered in the Bass River area in 1867 but not sighted for many years. In 1931, a skin was located amongst museum material and identified as Leadbeater's possum—*Gymnobelideus leadbeateri*. The date accompanying it was 1909, and the only locality information Mt. Wills. The elevation of Mt. Wills—5000 feet, gave some indication that this species might have a wider distribution than expected. It was not rediscovered until 1961 in the Marysville district (Brazenor, 1962), but the thoughts that it may yet be one of the Alpine mammals cannot be dispelled.

Another of the naturalist enthusiasts of north-eastern Victoria was Wakefield, who published on *P. penicillata* and other species from the region, and included valuable information on fossil deposits

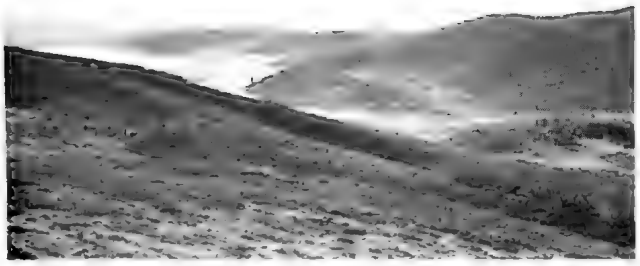

Plate 1. Above Rocky Valley Dam, Falls Creek area. Alpine habitat for *Burramys parvus* and other small mammals.
Photo: J. M Dixon

Plate 2. Mt. McKay environs. *Burramys parvus* habitat. Scattered snow gums, dense heath and granite boulders offer refuge.
Photo: J. M. Dixon

(Wakefield 1954, 1960a, b).

Little work was carried out on the High Plains, and in a Symposium on the Victorian High Plains, McEvey (1962) commented on the paucity of information available on the mammals of the area.

The ecological work of Calaby and Wimbush (1964) was the first detailed study carried out on a mammal living in Australian Alpine conditions. The species was *Mastacomys fuscus,* the broad-toothed rat, known then as a relatively rare animal. The area of study in the Kosciusko National Park was a sub-alpine zone at about 5600-6000 feet, a heath community covered with snow for about three months of the year. The authors noted that there was no need for these animals to hibernate in winter as there was no restriction to their movement, and food was plentiful beneath the snow. Burrows or other holes among rocks and vegetation provided shelter for these small rodents through all seasons. Subsequent survey work in other areas of the park by C.S.I.R.O. was the first detailed faunal work in Alpine Australia and had significant results. These will be discussed at greater length below.

In 1966, a small mammal was found alive in a ski lodge at Mt. Hotham—it was the mammal discovery of the decade. Speculation on its identity and origin was lengthy, and after considerable debate, assisted by the animal opening its mouth to reveal characteristic sectorial premolar teeth, it was pronounced to be a living specimen of *Burramys parvus,* now usually referred to as the

Plate 3 Sub-alpine tussock grasslands with winter snow cover – Bennison Plains. Habitat for a variety of native mammals
Photo J. M. Dixon

Plate 4 Dry open forest – Galbraith Saddle. Habitat for *Pseudomys fumeus*
Photo J. M. Dixon

mountain pigmy possum. It was previously known as fossil material only from both Victoria and New South Wales, having been described from the Wombeyan Caves by Broom (1896). The actual habitat of the Hotham animal was a problem. Had it been transferred up the mountain with wood or other material, or was it a native of that rather inhospitable (climatically) environment? This question could not be answered at the time. There were numerous small articles published on it (Seebeck 1967, Warneke, 1967).

Proof of the existence of this rare animal in the Alps came in 1970 following C.S.I.R.O. survey work in Kosciusko National Park. The collection of live specimens of *B. parvus* in the sub-alpine zone with boulder strewn, shrubby and scattered snow gum vegetation was published by Calaby, Dimpel and McTaggart Cowan (1971). The need for future study of this species in its natural habitat was emphasised in relation to both pure research and to conservation in the High Country. As the only Australian mammal which is restricted to the sub-alpine to alpine zone, it is of some significance.

In 1971 during brief field survey work on the Victorian High Plains by Dixon (1971a), *B. parvus* was captured in the Falls Creek area near Mt. McKay. The altitude was about 5900 feet, the area a granite tor studded hillside with scattered snow gums, alpine shrubs and heath. *Mastacomys fuscus* was located in the same area along with three other

small mammal species, allied rat—*Rattus fuscipes*, Swainson's marsupial mouse—*Antechinus swainsonii*, and brown marsupial mouse *Antechinus stuartii* (Dixon 1971b). More recently *Burramys* and other species have been located at Mt. Hotham, Victoria. All of these species, with the exception of *B. parvus* are well dispersed throughout south eastern continental Australia.

With the formation of the Victorian Land Conservation Council in 1970, the Alpine area became one which was to receive, like others in the state, investigation into numerous fields with a view to appropriate land utilisation. From the initial background of museum survey on the High Plains further field work was carried out in selected areas of the Victorian Alps. This work covered regions which can be described as alpine proper, as well as crossing a range of habitat types:— sub-alpine woodland, wet open forest, dry open forest, woodlands, semi-cleared areas and forest margins and grasslands. (For list of species see Table).

The investigations by museum and other teams and analysis of archival information have been compiled by Dixon (1976). The report produced gives some indication of the minute areas of the Alps which have received survey attention. The habitat needs of species with restricted distributions are of special interest. These are the species which need urgent attention—they are subjected to the impact of a variety of forces—and they have no control over their environment.

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TABLE

ALPINE AREA

List of Mammal Species

MONOTREMATA

Tachyglossidae

Tachyglossus aculeatus	Echidna

Ornithorhynchidae

Ornithorhynchus anatinus	Platypus

MARSUPIALIA

Macropodidae

Macropus giganteus	Eastern grey kangaroo
M. rufogriseus	Red-necked wallaby
Wallabia bicolor	Black wallaby (Swamp)
Petrogale penicillata	Brush-tailed rock wallaby
† *Macropus robustus*	Euro

Phalangeridae

Trichosurus vulpecula	Brush-tailed possum
T. caninus	Bobuck (Mountain possum)

Petauridae

Pseudocheirus peregrinus	Ring-tailed possum
Petaurus breviceps	Sugar glider
P. norfolcensis	Squirrel glider
P. australis	Yellow-bellied glider
Schoinobates volans	Greater glider
Gymnobelideus leadbeateri	Leadbeater's possum

† The euro has been recorded from the north-eastern portion of the Alps, but we have no representative material.

Burramyidae

Acrobates pygmaeus	Pigmy glider (Feather-tail)
Cercartetus nanus	Eastern pigmy possum
Burramys parvus	Mountain pigmy possum

Phascolarctidae

Phascolarctos cinereus	Koala

Vombatidae

Vombatus ursinus	Common wombat

Peramelidae

Perameles nasuta	Long-nosed bandicoot

Dasyuridae

Dasyurus maculatus	Tiger cat
Phascogale tapoatafa	Brush-tailed phascogale (Tuan)
Antechinus stuartii	Brown marsupial mouse
A. swainsonii	Swainson's or Dusky marsupial mouse

RODENTIA

Muridae :

Rattus fuscipes	Bush rat
Hydromys chrysogaster	Water rat
Mastacomys fuscus	Broad-toothed rat
Pseudomys fumeus	Smokey mouse

Classification of native mammals after Ride (1970)

CHIROPTERA

Vespertilionidae

Nyctophilus timoriensis	Greater long-eared bat
N. geoffroyi	Lesser long-eared bat
Miniopterus schreibersii	Bent-winged bat
Eptesicus pumilus	Little bat
Chalinolobus gouldii	Gould's wattled bat
C. morio	Chocolate bat
Pipistrellus tasmaniensis	Tasmanian pipistrelle

Rhinolophidae

Rhinolophus megaphyllus	Eastern horseshoe bat

Molossidae

Tadarida australis	White-striped bat

CARNIVORA

Canidae

Canis familiaris	Dingo

INTRODUCED MAMMALS

Oryctolagus cuniculus	Rabbit
Lepus europaeus	Hare
Mus musculus	House mouse
Rattus rattus	Black rat
Vulpes vulpes	Fox
Felis catus	Cat
Equus caballus	Brumby
Bos taurus	Cow
Cervus unicolor	Sambar deer
C. elaphus	Red deer

Erratum

There are two errors in co-ordinates in the article "The First Victorian and other Victorian records of the Little Pigmy Possum Cercartetus lepidus (Thomas)" published in Victorian Nat. 95, Jan/Feb. 1978. (1) p.5 Lat. 36°50'S should be Lat. 35°50'S (2) p.6 Long. 114°23'E should be 141°23'E

Wedge-tailed Eagle King of the Air?

During the early afternoon on 22/10/78 on the banks of the Kangaroo Creek, Porcupine Ridge near Daylesford I noticed a wedge-tailed eagle and a bird which looked like a crow flying up the valley. The two birds alighted on a tree. Soon the eagle flew off. Then I noticed five medium sized birds diving at the eagle and they kept up their attack as the eagle flapped his way out of the territory.

R. D. K.

Aborigines in the Ranges

BY J. G. DOUGLAS*

Well documented sites, and the experiences of early settlers show that the aborigines lived in and about the fringes of the Otway Ranges, but there has been a long held belief, mentioned by Massola (1966, 1969), Scarlett (1977), and others, that they did not penetrate into the interior. Both these authors however suggest that the aborigines did visit or cross the ranges, although they were unable to offer any satisfactory supporting evidence.

A small collection of implements from Lavers Hill, made by my father W. G. Douglas in 1928 whilst headmaster of the school, and still in his possession, provides more information on the subject.

Three stone axe heads were found beside a soak or spring 100m to the north of the present Great Ocean Road, behind the township which is on top of the main ridge, in one of the wettest and most elevated parts of the ranges. I think it is fair to suggest that whether in transit, or in more permanent residence, these people used the site because of the close proximity of water to a main trail along the ridge, making descent into the more thickly vegetated gullies unnecessary.

All the axes have been tentatively identified as Cambrian greenstone, or probable greenstone. In Victoria there are several outcrops of greenstone which might have been the source. The closest are in the Barrabool Hills near Geelong, and the Mount Stavely-Mount Drummond area south of the Grampians. As no thin sections have been cut to facilitate more authoritative identification, it is possible that the implements were derived from the aboriginal quarry near Gellibrand, in basalt or dolerite of probable Oligocene age.

Two axes (Figs. 1a, 1b, 4) are broken, but still retain a very sharp cutting edge (7 cm long on the largest axe).

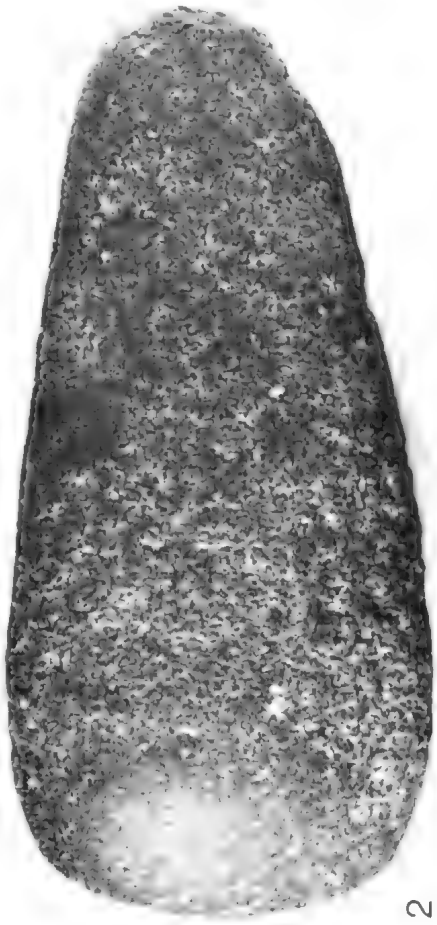


Fig. 2. Aboriginal axe, Rocky Jack Divide

*Department of Minerals and Energy
107 Russell Street, Melbourne

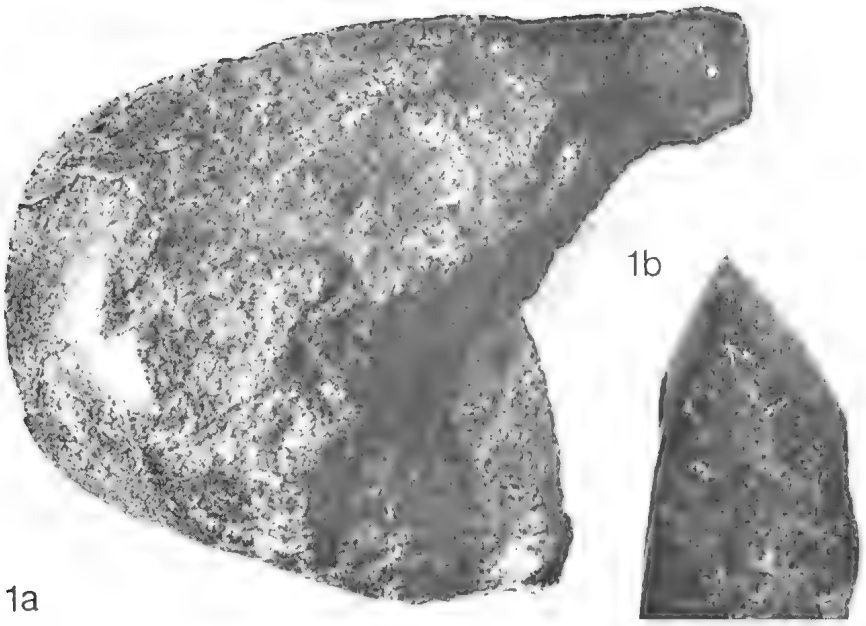


Fig. 1 a, 1b, Aboriginal axe, Lavers Hill

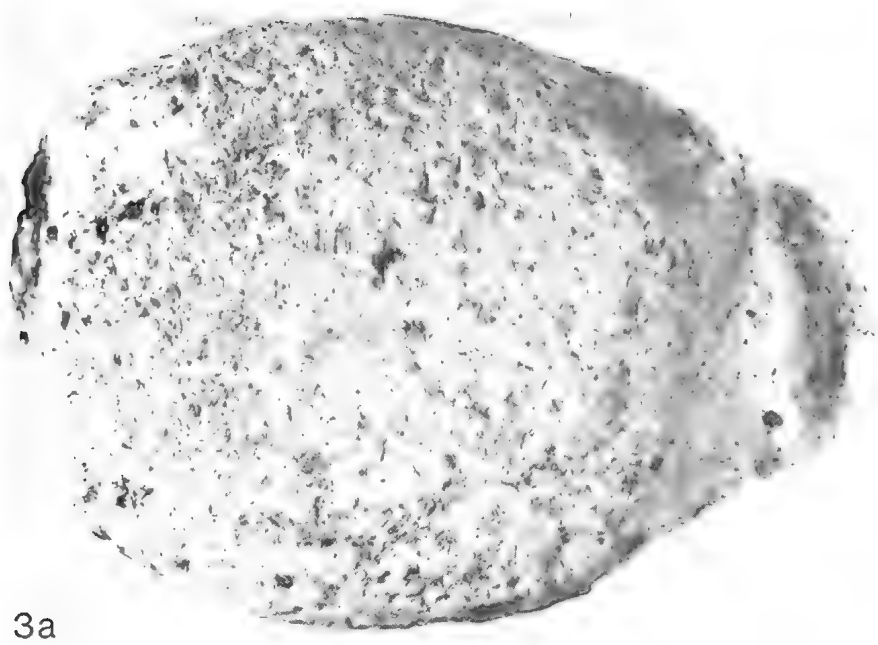


Fig. 3a, Aboriginal axe, Lavers Hill.

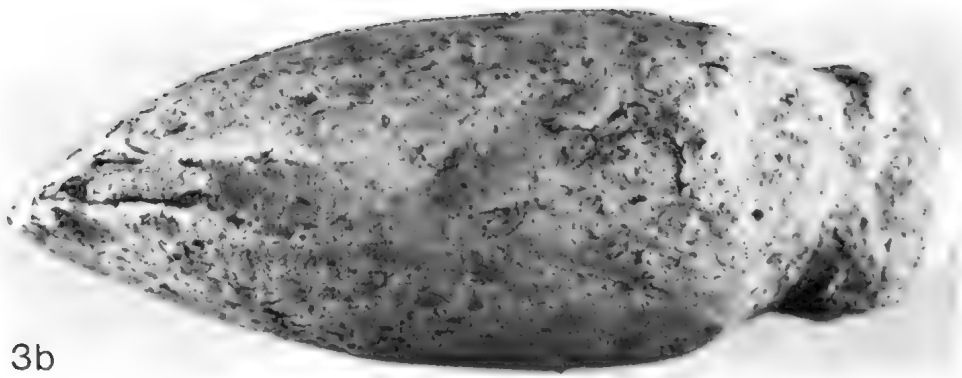
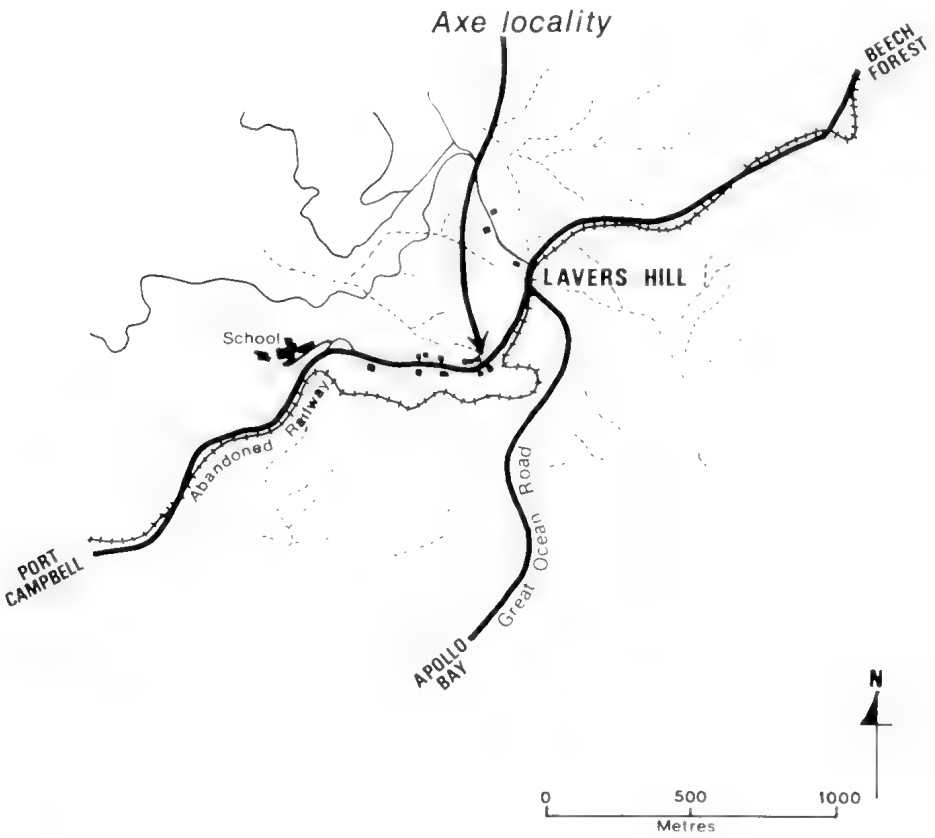


Fig. 3b. Aboriginal axe, Lavers Hill. All figures are a little smaller than natural size. Photography by Mrs. J. O'Dwyer.



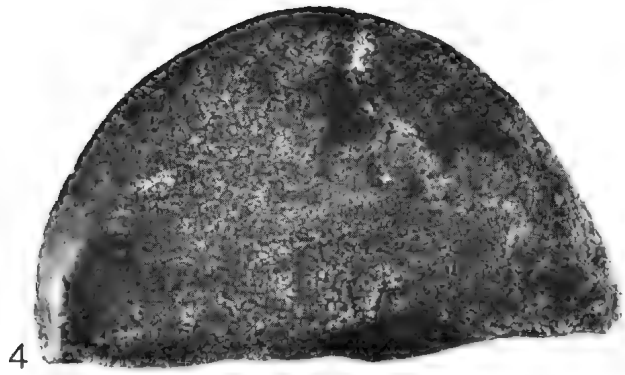


Fig. 4. Aboriginal axe, Lavers Hill.

The third specimen (Figs. 3a, 3b) is a complete axe head, nearly 12 cm long and 8 cm in width at its broadest part, with a white powdery siliceous coating. I find it particularly intriguing because although I am a geologist by profession I had always regarded it as flint. However, Mr. P. Kenley of the Geological Survey, after examination of a small area free of white coating, has identified it as an igneous rock, probably greenstone. Proximity to, or immersion in the spring may have accelerated weathering resulting in a superficial resemblance to flint. Some peope may be interested in additional implement sites in the southern highlands. I have sighted a large collection from the cleared area between the post office at Dollar and the Tarwin River, in the Strzelecki Ranges, and picked up an axe on the Forest Commission track, Rocky Jack Divide, north of Orbost (Fig. 2; length 14 cm, width 6.5 cm).

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Australian Natural History Medallion Fund

Amount on hand invested August 1978	$731.00
Mr Eric Allan (2nd donation)	3.00
Mrs D. W. Mc Kellar	10.00
Mrs Dora Cameron	25.00
Miss Ethel Dixon	20.00
Total	$789.00

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The price to members is a minimum of 40 cents a single issue or the face value if higher. Postage extra.

Enquire from the Sales Officer if the numbers you want are available.

Gungartan: A Winter Fauna Survey Above 1500 Metres

BY W. OSBORNE, M. PREECE, K. GREEN AND M. GREEN*

Summary

A survey of the fauna present in mid-winter above 1500 metres in the Gungartan region of Kosciusko National Park, N.S.W., has revealed the presence of 8 species of mammals; 4 marsupials, 1 native eutherian and 3 introduced species. 14 species of birds were recorded, of which 1 was introduced. Invertebrates found to be active included 6 species of insect and 1 arachnid.

Introduction

The purpose of the survey was to establish which mammals, birds and invertebrates remain active above the permanent winter snowline during mid-winter. As such, the survey was confined to those areas above 1500 metres. The survey was conducted over a three week period, 7th-28th July, 1978. At this time, the area had a deep snow cover, generally exceeding 1 metre in depth, and was subject to further heavy snowfalls during the survey period. The average maximum temperature during the survey was +2°C and the average minimum was −5°C. The weather was generally overcast with some days of sunlight.

Description of Area

The study area, which comprised some 65 square kilometres of Kosciusko National Park was centred around the Mount Gungartan (2068 m) region which lies 5.5 kilometres north of the Guthega Hydro-Electric Power Station. The survery extended northwards to Grey Mare Hut and southwards to Disappointment Spur Hut; and was bounded to the west by The Rolling Ground and The Ghost and to the east by The Porcupine Mountain and Finns River. (See Figure 1.)

Topography. The physiography of the area is largely the result of Pleistocene glaciations and present day periglacial and other weathering processes. The general topography of the area consists of steep, evenly sloped ridges which are often crowned by granite tors along their flattened summits. Between these ridges run rounded alpine valleys, many of whose floors are studded with morainic boulders. Numerous smaller creeks dissect and drain the elevated mountain flats into these larger valleys. Poorly drained alpine swamps occur along some of the rivers and mountain flats.

Geology and Soils. The geology of the Gungartan area consists mainly of a massive intrusion of largely foliated, gneissic granite and granodiorite. This intrusion comprises part of the Kosciusko Batholith which intruded the parent rock during the late Devonian early Silurian periods. Also occurring in the area is a narrow outcrop of Ordovician quartzoze, which forms the westernmost extension of this Ramshead/Kosciusko intrusion.

The principal soil types of the area consist of Alpine Humus soils, described by Costin (1954).

Vegetation. The vegetation of the study area is quite diverse, consisting of a series of Alpine Complexes, including Sod tussock grasslands; Alpine herbfields; Heaths; Wet scrubs; and Woodlands, (Costin 1954). Because of the deep snow cover during the survey period, a detailed study of the vegetation was not undertaken.

*Student Residences, C.C.A.E. Box 20, Belconnen. A.C.T. 2616.

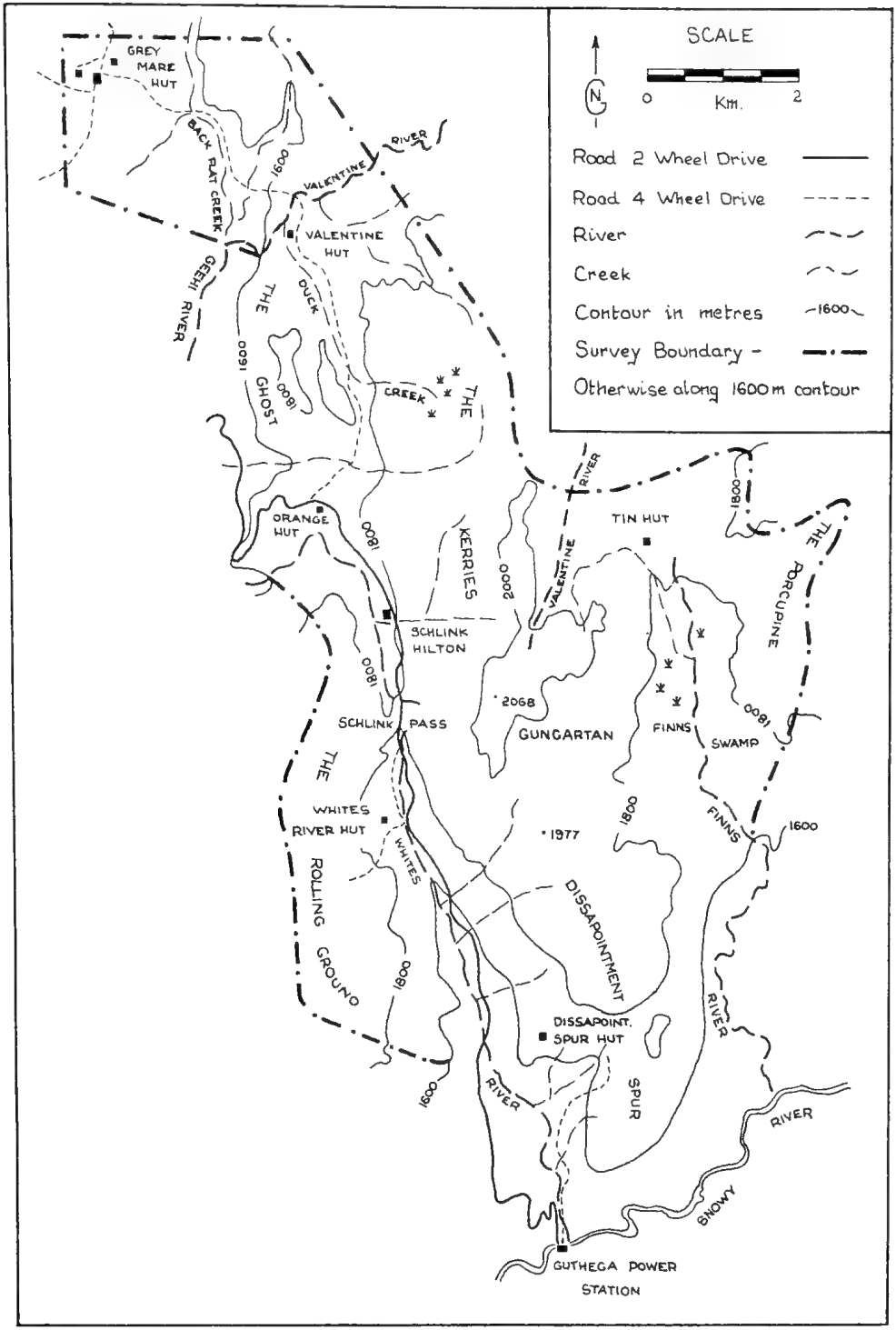

Fig. 1 Fauna Survey Area.

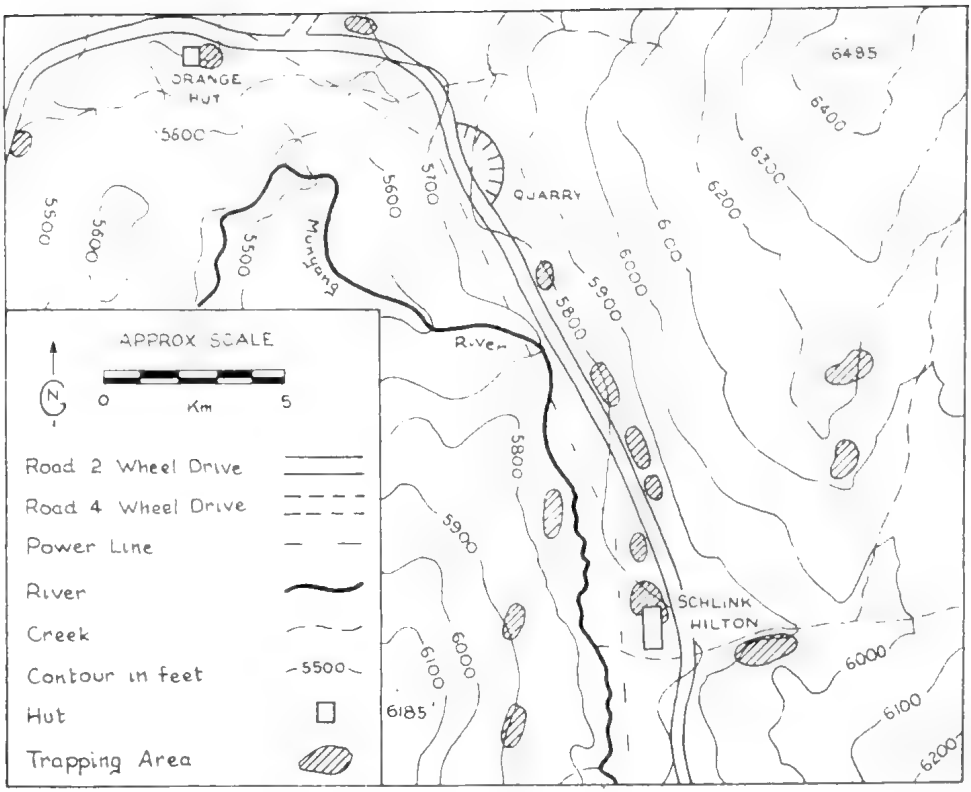

Fig. 2 Concentrated Trapping Area Centred on Schlinks "Hilton".

Methods

Trapping, spotlighting, observation by day and interpretation of tracks and faeces were the main methods by which animal presence was noted. Small mammals were trapped using 32.5 cm x 9 cm x 9.5 cm Elliot traps which were baited with a mixture of peanut butter, honey and oatmeal. Insulation in the form of wood shavings was provided as a safeguard against the animals freezing whilst in the trap. In most cases traps were located beneath the snow or were covered by snow blocks. The traps were checked twice daily, between 9.00 and 10.00 in the morning and between 4.00 and 5.00 in the afternoon. Animals caught were identified, weighed, sexed and marked before being released at the site of capture. Short term marking was carried out using an indelible, non-toxic, felt pen.

Additional evidence of mammal presence was provided by tracks in the snow. Excursions by ski proved the only way by which large areas could be surveyed and the location of such tracks noted.

Spotlighting was carried out using a sealed beam spotlight powered by a 12 volt motorcycle battery. Observations were usually made between dusk and midnight.

Faeces were also noted and collected.

Birds present were recorded from sightings; the time of sighting, the number of birds and their activity were also noted.

Invertebrates were collected from the snow surface. No investigation beneath the bark of trees was conducted.

Results

Three groups of animals were found to be active above 1500 metres during the survey. These were mammals, birds and arthropods. Of the eight mammals recorded, five were native species. Of the fourteen species of birds noted, only one species was introduced. Six species of insects and one species of spider were also considered to be active (were moving when found). Details of the results are summarised in Tables 1-4. Classification follows that of Ride (1970), Royal Australasian Ornithologists Union (1975), and C.S.I.R.O. (1970).

Trapping results were obtained from the areas illustrated in Figure 2.

Notes on the Species Recorded

(1) MAMMALS

Swainson's Antechinus, *Antechinus swainsonii*

Ten different specimens were trapped in run-aways beneath the snow along a road erosion gully near the Schlink-Hilton Hut. All individuals trapped were males. Intensive trapping in rocks and along creeks in other areas was unsuccessful.

Brown Antechinus, *Antechinus stuartii*

Although *A. Stuartii* was not collected in the field, it was found to be present in and underneath some of the huts. A dead male was found in Disappointment Spur Hut. A second male was caught in Valentines Hut.

Wombat, *Vombatus ursinus*

Three wombats were recorded during the study period. All were seen walking across snow in mid-afternoon. Wombat tracks were found along the following valleys; Whites River to 2km south of Whites River Hut, Valentines Creek, Duck Creek, Straight Creek and Finn's Swamp. The highest recorded wombat tracks were seen at 1850 metres 1 km S.S.E. of Tin Hut.

Ringtail, *Pseudocheirus peregrinus*

Only one individual was observed. This sighting was made at night near the Schlink-Hilton Hut. Unoccupied possum nests were found near Orange Hut and Disappointment Spur Hut. Several sets of possum tracks leading to trees were noted in open areas near Whites River Hut.

Allied Rat, *Rattus fuscipes*

Two individuals were collected in traps set below the snow near Schlink-Hilton Hut. Another specimen was caught in a trap set on the snow's surface, 100 metres south of Disappointment Spur Hut. This trap had been set where rat tracks ended at a hole in the snow. A fourth rat was found lying dead on the snow's surface on an open plain at Straight Creek. Rat tracks were often seen in all areas throughout the region. Individual sets of rat tracks were found to extend a distance of 150 metres.

Rabbit, *Oryctolagus cuniculus*

Rabbit tracks and faecal pellets were seen along sheltered valleys near Valentines Hut at an altitude of 1700 metres. Rabbit faeces were also noted near Whites River up to about 1600 metres.

Hare, *Lepus eurpaeus*

Although only four sightings of hares were made, they were apparently very common throughout the region. Following each fall of fresh snow, tracks were noted commonly in all areas except on the Rolling Ground. The area west of Orange Hut through which a wildfire burned in 1972-73 showed most evidence of hare activity.

Fox, *Vulpes vulpes*

Foxes are apparently quite common. One fox was sighted by spotlight near Schlink-Hilton hut and another was seen 1 km S.E. of Mount Gungartan. Fox tracks were seen to follow rat tracks for considerable distances and at several locations large holes had been scratched through the snow. Fox faeces were collected from some localities.

Dog, *Canis familiaris* (subspecies?)

Tracks were found on two occasions in the vicinity of Valentines Hut.

Wedge-tailed Eagle, *Aquila audax*

Two wedge-tailed eagles were observed together circling over an open area 2 km north of Valentines Hut. Two further individuals were also observed circling, one over Finn's Swamp, the other over a tor north west of Orange Hut.

Peregrine Falcon, *Falco peregrinus*

The only recording of a peregrine falcon was made near the Rolling Ground. Due to conditions of poor visibility, the bird was identified from its alarm call rather than by sight.

Yellow-tailed Black Cockatoo, *Calyptorhynchus funereus*

These were observed either in flight or perched in trees but at no stage were they observed feeding.

Gang Gang Cockatoo, *Callocephalon fimbricatum*

Gang gangs were observed flying in areas of woodland at the northern and southern ends of the survery area.

Crimson Rosella, *Platycercus elegans*

These were mainly seen in flight but were also observed feeding on the buds of *Eucalyptus pauciflora* and *E. stellulata*.

Grey Shrike-Thrush, *Colluricincla harmonica*

Three recordings were made of this species at widely separated localities. In each case the individuals were observed feeding on the snow's surface in woodland.

White-Browed Scrub Wren, *Sericornis frontalis*

These were observed in areas of woodland moving through the lower levels of the vegetation.

Striated Thornbill, *Acanthiza lineata*

The striated thornbill was generally seen feeding in upper and lower levels of trees and was also observed feeding on the ground beneath the trees. It was recorded in the valleys of Dicky Cooper Creek and Whites River.

White-Throated Tree Creeper, *Climacteris leucophaea*

Observations were dispersed throughout the survey area, the bird was generally seen feeding on tree trunks.

Starling, *Sturnus vulgaris*

Starlings were seen in the vicinity of Schlinks-Hilton and Tin Hut.

White-backed Magpie, *Gymnorhina tibicen hypoleuca*

These were observed at locations throughout the survey area and were generally seen feeding on the snow's surface.

Pied Currawong, *Strepera graculina*

Several individuals were recorded flying and calling near Whites River at 1600 metres.

Grey Currawong, *Strepera versicolor*

The only recording of this species came from the southern end of the survery area. It was observed in flight.

Little Raven, *Corvus mellori*

This was the most widely distributed and the most commonly recorded bird. It was generally seen on the snow's surface, perching in trees, or in flight and was the only bird observed to be active during blizzards.

Discussion

The depth of snow recorded imposed certain limitations on movement of mammals. *Rattus fuscipes* was found to move beneath the snow but often emerged through pop-holes (usually situated beneath leaning tree trunks) and travelled up to 150 metres above the snow. *Antechinus swainsonii* was not observed to move above the snow, but was recorded as having travelled a distance of 50 metres below the snow. *A. stuartii* was observed above the snow on one occasion within a metre of a hut.

As observed by Calaby and Wimbush (1964) the milder micro-climate preserved beneath the snow enables small mammal activity to continue despite external weather conditions. The results of the present study agree with this and no relationship was found between sunny weather and below-snow mam-

TABLE 1

SYSTEMATIC LIST OF MAMMALS RECORDED IN THE GUNGARTAN REGION

Order Marsupialia	
Family Dasyuridae:	
Swainsons Antechinus	*Antechinus swainsonii*
Brown Antechinus	*Antechinus stuartii*
Family Vombatidae:	
Common Wombat	*Vombatus ursinus*
Family Phalangeridae:	
Ringtail Possum	*Pseudocheirus peregrinus*
Order Rodentia	
Family Muridae:	
Allied rat	*Rattus fuscipes*
Order Lagomorpha	
Family Leporidae:	
Rabbit	*Oryctolagus cuniculus*
Hare	*Lepus europaeus*
Order Carnivora	
Family Canidae:	
Red Fox	*Vulpes vulpes*

mal activity.

On the snow surface hares were not observed to have any difficulty in moving. Foxes were found to often use the compressed snow of other animal tracks or ski tracks to facilitate progress. Wombats had difficulty travelling in soft snow, possibly due to the shortness of their legs and hence the necessity of pushing their bodies through the snow.

TABLE 2

DETAILS OF MAMMAL SURVEY

Period	3 weeks in July 1978	
Number of trap nights	196	
Number of spotlight hours	4	
		Total Number
(a) Number of animals caught per 100 trap nights		
Antechinus swainsonii	5.1	10(+11 recapture)
Antechinus stuartii	3.1	6
Rattus fuscipes	1.5	3
(b) Number of animals seen per spotlight hour		
Pseudocheirus peregrinus	0.25	1
Vulpes vulpes	0.25	1
(c) Number of animals seen during daylight		
Vombatus ursinus		3
Lepus europaeus		3
Vulpes vulpes		1
Rattus fuscipes (dead)		1
Antechinus stuartii (dead)		1
(d) Species recorded from other evidence		
Oryctolagus cuniculus - tracks and faecal pellets		
Canis familiaris (subspecies?) - tracks recorded on two occasions		

Trapping did not result in the capture of *Burramys parvus* or *Mastacomys fuscus*, two species known to occur in the area, (Calaby, Dimpel and McTaggart Cowan, 1971). Both species are believed to remain active throughout the winter.

The echidna, *Tachyglossus aculeata*, was not sighted in the present study but has been observed on the snow surface later in the season.

Bird activity was generally confined to the valleys within the study area, exceptions being the little raven, peregrine falcon and wedge-tailed eagle. The little raven appeared to be the most well adapted to winter conditions, being the only bird recorded in flight during blizzards. The white-browed scrub wren, at the other extreme, was observed to shelter under snow-laden vegetation along earth banks on roadsides.

The arthropods collected were dis-

TABLE 3

BIRDS RECORDED FROM THE GUNGARTAN REGION

Scientific Name	Common Name	Frequency of Recording
Aquila audax	Wedge-tailed eagle	Uncommon
Falco peregrinus	Peregrine falcon	Uncommon
Calyptorhynchus funereus	Yellow-tailed black cockatoo	Very common
Callocephalon fimbriatum	Gang gang cockatoo	Common
Platycercus elegans	Crimson rosella	Very common
Colluricincla harmonica	Grey shrike thrush	Uncommon
Sericornis frontalis	White browed scrub wren	Uncommon
Acanthiza lineata	Striated thornbill	Very common
Climacteris leucophaea	White-throated tree creeper	Common
Sturnus vulgaris	Common starling	Common
Gymnorhina tibicen hypoleuca	White-backed magpie	Common
Strepera graculina	Pied currawong	Uncommon
Strepera versicolor	Grey currawong	Uncommon
Corvus mellori	Little raven	Very common

covered on sunny days, on one such day the shade temperature reached a maximum of 12.5°C. It is considered unlikely that the arthropods were blown to the collection sites from lowlands due to the distance involved and the absence of wind on many days.

The scarcity of invertebrates during the study, the confinement of the activity of certain mammals to beneath the snow and the presence of foxes raises the question of their predation habits during winter. No data is available as yet but fox scats were collected for analysis.

Acknowledgements

The authors gratefully acknowledge the aid of the following: L. Best for his initial guidance and helpful suggestions; J. H. Calaby for his advice and assistance concerning small mammals; The Canberra College of Advanced Education for loan of equipment; B. Gall for his willing co-operation and loan of equipment; P. Zborowski for identification of

TABLE 4

INVERTEBRATES COLLECTED FROM SNOW SURFACE

	Number Observed
Class Insecta	
Order Coleoptera	
Family Tenebrionidae :	
Cardiothorax sp.	1
Family Chrysomelidae :	
Paropsis sp.	1
Family Carabidae *1	1
Order Blattodea *2	
Family Blattidae :	
Platyzosteria sp.	1
Order Orthoptera	
Family Acrididae :	
sub Family Oxyinae	1
Order Diptera *1	1
Class Arachnida	
Order Aranea	
Lycosa sp.	1

*1 Observed but not collected

*2 One other Blattodea was observed in the field but not collected.

insect specimens; The Snowy Mountains Authority for the use of the Schlink 'Hilton' Hut; the N.S.W. National Parks and Wildlife Service for permission to trap and collect specimens.

The following people provided field assistance at various times:
P. Geleris, R. Lea, V. Masala, A. Mednis, A. Montgomery, R. Palmer and R. Tait.

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The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 187 in the previous issue)

BY JAMES A. BAINES

Phyllota. Gk phyllon, leaf; ous, otos, ear; because the bracteoles of some species are leafy. An endemic Australian genus (Burbidge says 4 to 5 spp., J. C. Willis 10) of family Papilionaceae, of which Victoria has only 2, *P. pleurandroides* and *P. remota*, the former named from resemblance to the genus *Pleurandra* synonymous with *Hibbertia* and meaning side-anthered, and the latter from its remote habitat in the Little Desert.

***Physalis.** Gk physalis, a bladder, bubble; (cf. physa, a pair of bellows); from the inflated calyx. Our 3 introduced species are **P. viscosa*, Sticky Ground-cherry, **P. peruviana*, Cape Gooseberry (so-called because, although a native of Peru, it was cultivated at the Cape of Good Hope and brought thence to N.S.W. at the end of the 18th Century), and **P. alkekengi*, Winter Cherry, Bladder Cherry, Alkekengi, or Chinese Lantern Plant. The specific epithet of the last-named is the Arabic name; in German it is Judenkirsche, Jewish Cherry, and the genus is a member of the family Solanaceae.

***Phytolacca.** Gk phyton, a plant; modern Lat lacca, from Hindi lakh, referring to the dye extracted from the lac insect. The allusion is to the staining qualities of the fruit, hence the name inkberry. Our species, **P. octandra*, Red-ink Weed or Red Ink Plant, is a native of North and South America. **P. dioica*, the Ombu tree of South America, which sometimes persists in deserted gardens, figures in books by W. H. Hudson, who was born in Argentina in a house with a Spanish name meaning 'The 25 Ombu Trees'. The genus gives its name to family Phytolaccacaea.

***Picris.** Gk name, in Theophrastus, of a bitter herb (pikros, bitter) resembling lettuce (according to Black); the plants have a bitter taste (cf. picric acid). Our 2 introduced species are **P. echioides*, Oxtongue, and **P. hieracioides*, Hawkweed Picris, so-called from its resemblance to hawkweeds *(Hieracium)*, fellow members of family Compositae.

Notes on the Molluscs of the Victorian Great Dividing Range

BY BRIAN J. SMITH*

Introduction

The Great Dividing Range is the major topographical feature of Victoria, being a high mountain range with winter snow-fields and densely forested lower slopes. It has had a major influence on the distribution of animals in the South-eastern Australian faunal region, acting both as a habitat zone itself and as a barrier to faunal movement. In some ways the effects of the Range have been more significant than those of Bass Strait, being the northern boundary of the so-called Bassian Faunula (Iredale, 1937).

Early work on the non-marine molluscs of Victoria was carried out by Cox and Hedley (1912) and Gabriel (1930, 1939, 1947) while a study of the molluscs of the Snowy River area was carried out by Gabriel and Macpherson (1947). More recently faunal studies have been published of areas within Victoria (Smith, 1977) and a current synopsis of the fauna prepared (Smith and Kershaw—in press).

Mollusc Fauna of the Range

The non-marine mollusc fauna of the Victorian Great Dividing Range is typical of the whole South-eastern Australian region. The fauna consists of 57 species in 19 families and includes several species considered endemic to the Range. This paper is not intended to be a complete survey of molluscs of the area, but rather aims at pointing out the main characteristics of the fauna and noting items of special interest.

Within an area such as the Great Divide the main factor limiting animal distribution is habitat type. Four main habitat types can be recognised in the Range, each with its own mollusc fauna. These are freshwater, wet forest, dry forest and alpine and man-modified areas.

Freshwater Aquatic Habitat

There is a wide variety of freshwater habitats in the Great Divide, ranging from the fast flowing mountain rivers and creeks to dams, lakes and alpine bogs. Nineteen species of freshwater molluscs are known from the area.

Rivers and permanent creeks form the principal aquatic habitat. In the upland areas these are fast flowing with alternate riffle-rapid and pool sections and largely clean sand to coarse gravel bottoms (Smith et al, 1977). Freshwater limpets are commonly found adhering to the stones, large mussels and small pea shells are found in the finer sediments of the pool sections, while planispiral and high-spired planorbids occur along the margins where vegetation occurs. In the flatter, lowland country the rivers are deeper and slow flowing with a fine suspended solid load. These rivers are subject to spring floods which replenish the waters in the associated billabong systems which are otherwise rich, isolated water bodies with prolific aquatic vegetation growth and fine sediment. These habitats usually contain the planorbids *Physastra gibbosa* and *Isidorella hamesii*, the small flat *Segmitila victoriae* and lymnaeids.

Small forest streams and waterfalls often contain the small round-shouldered hydrobiid *Pupiphryx grampianensis*.

The most interesting freshwater snail in Victoria is the small planispiral oper-

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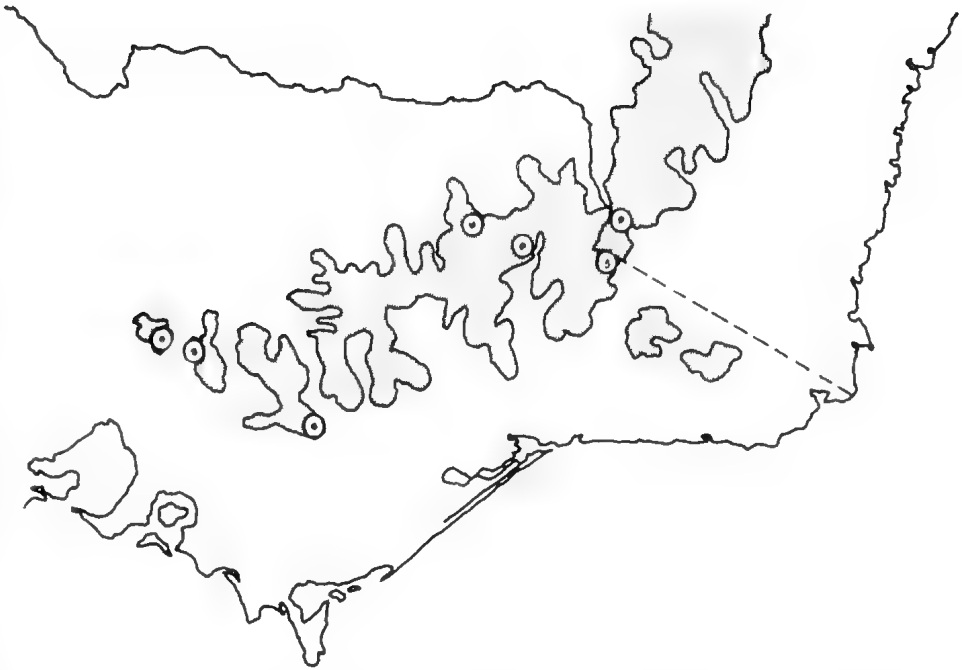

Fig. 1. Map of the known distribution of *Glacidorbis hedleyi*. The line is the boundary of the Great Dividing Range in eastern Victoria.

culate *Glacidorbis hedleyi* recently redescribed by Meier-Brook and Smith (1975). It is now known from seven localities in Victoria and southern N.S.W. in acidic waters of alpine streams and bogs to mountain lakes and forest streams (Fig. 1). Because of its small size (maximum diameter 2 mm) it has been overlooked until detailed faunal surveys have been carried out in recent years in the Alpine area. It is closely related to species from similar habitats in Tasmania and southern Chile.

Wet Forest Habitat

The Great Divide contains large areas of wet sclerophyll and temperate rainforest with dense vegetation, deep fern gullies and a deep wet litter containing abundant fungus and mosses. The forest floor has a high humidity and rarely, if ever, dries out. The mollusc fauna of this habitat is similar to that of the same habitat type in the Otways (Smith, 1977) and Tasmania. Thirteen species of molluscs are described from this habitat in the Range, of which several are endemic to the Range. The most spectacular is the large carnivorous snail *Victaphanta atramentaria* (Fig. 2.), confined to the central part of the Range. Several charopid species are also found only in this part of the Range, including *Rhophodon problematica* and *Pillomena marysvillensis*.

Dry Forest and Alpine Habitat

This category includes all the uncleared terrestrial habitat of the Range apart from the wet forest area. It consists of dry sclerophyll forest to open woodland to alpine meadow and is characterized by shallow litter or open ground surface which dries out completely in the summer. Twenty-one species of molluscs are recorded from this habitat type in the Great Divide including several species introduced into Australia which encroach into native bush areas. Most characteristic of this habitat are the

Fig. 2. Large carnivorous snail, *Octaphanta atramentaria*, endemic to the Great Divide of Victoria. (Photo by E. Winsor)

snails *Helicarion niger*, *Chlorritobadistes victoriae* and in the eastern ranges the large snail *Pygmipanda atomata*, together with charopids of the genera *Elsothera*, *Pernagera* and *Pillomena*.

Man Modified Areas

An alarming amount of the Victorian Great Divide has been extensively modified by European man. Large tracts of forest have been cleared, roads have been built and introduced plants and animals established over most of the area, to such an extent that no part of the Range can now be said to be in the state it was in prior to the settlement of European man in Australia over the past two centuries. Some of the native molluscan species have adapted to life in these modified areas. However the dominant molluscs of these areas and of the Great Divide as a whole are the introduced snails and slugs accidentally brought from Europe on plants, implements etc. by the settlers (Altena and Smith, 1975). These species are mainly pests, feeding on pasture and garden crops. Their only positive value is that they do provide a food source for some of the introduced birds and mammals. Altogether twelve species are found in this man-modified environment, only two of which are native species.

Acknowledgements

This work on the non-marine mollusc fauna of south-eastern Australia is supported by the Australian Biological Resources Study to whom thanks are due. Thanks are due to Ms. Fletcher of Monash University for data on *Glacidorbis*. Thanks are also due to Ms. Rhyllis Plant of the Invertebrate Department of the Museum for drawing and data extraction, to Mr. F. Coffa for assistance with photography and to Mrs. Lyn Anderson for typing the manuscript.

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Species List of Molluscs of the Victorian Great Divide

Abbreviations used after the species names are:

A = freshwater habitat; B = wet forest habitat; C = dry forest and alpine habitat; D = man modified habitat; E = endemic to the Great Divide; I = introduced into Australia.

HYDROBIIDAE

Glacidorbis hedleyi Iredale, 1943. A,E.

Pupiphryx grampianensis (Gabriel, 1939). A.

Potomopyrgus niger (Quoy & Gaimard, 1835). A.

LYMNAEIDAE

Austropeplea lessoni (Deshayes, 1830). A.

A. tomentosa (Pfeiffer, 1855). A.

ANCYLIDAE

Ferrissia (Pettancylus) petterdi (Johnston, 1879). A.

F. (P.) tasmanica (T.-Woods, 1876). A.

PLANORBIDAE

Physastra gibbosa (Gould, 1847). A.

Isidorella hainesii (Tryon, 1866). A.

Segnitila victoriae (Smith, 1882). A.

Gyraulus scottianus (Johnston, 1879). A.

G. tasmanicus (T.-Woods, 1876). A.

RHYTIDIDAE

Victaphanta atramentaria (Shuttleworth, 1853). B,E.

Tasmanphena ruga (Legrand, 1871). B,C.

Rhytida capillacea (Ferussac, 1832). C.

Prolesophanta dveri (Petterd, 1879). B.

CARYODIDAE

Pygmipanda atomata (Gray, 1834). C.

PUNCTIDAE

Paralaoma caputspinulae (Reeve, 1854). C.

Laomavix collisi (Brazier, 1877). C,D.

Miselaoma weldii (T.-Woods, 1877). C.

Magilaoma penolensis (Cox, 1868). C,D.

CHAROPIDAE

Discocharopa inexpectata (Gabriel, 1947). B,E.

Elsothera sericatula (Pfeiffer, 1850). C.

E. funerea (Cox, 1868). B,C.

Allocharopa okeana (Gabriel, 1947). C,E.

Pernagera tamarensis (Petterd, 1879). C.

P. officeri (Legrand, 1871). C.

Dentherona saturni (Cox, 1868). C.

Rhophodon problematica (Gabriel, 1947). B,E.

Pillomena meraca (Cox & Hedley, 1912). B.

P. dandenongensis (Petterd, 1879). B.

P. nivea (Hedley, 1896). B.

P. marysvillensis (Gabriel, 1947). B,E.

Thryasona elenescens (Cox & Hedley, 1912). C.

Mulathena fordei (Brazier, 1871). B,C

ARIONIDAE

Arion intermedia (Normand, 1852). C,D,I.

ZONITIDAE

Oxychilus alliarius (Miller, 1822). D,I.

LIMACIDAE

Deroceras reticulatum (Muller, 1774). D,I.

D. caruanae (Pollonera, 1891). D,I.

Lehmannia (Lehmannia) nyctelia (Bourguignat, 1861). D,I.

L. (Limacus) flavus (Linnaeus, 1758). D,I.

Limax maximus (Linnaeus, 1758). D,I.

MILACIDAE

Milax gagates (Draparnaud, 1801). D,I.
CYSTOPELTIDAE
Cystopelta petterdi (Tate, 1881). B,C.
HELICARIONIDAE
Helicarion niger (Quoy & Gaimard, 1832). B,C.
CAMAENIDAE
Chloritobadistes brevipila (Pfeiffer, 1850). C.
C. victoriae (Cox, 1868). B,C.
HELICIDAE
Helix (Cryptomphalus) aspersa (Muller, 1774). D,I.
Cochlicella ventrosa (Ferussac, 1821). D,I.
HYRIIDAE
Hyridella (Hyridella) australis (Lamarck, 1819). A.
H. (H.) drapeta (Iredale, 1934). A.
H. (H.) depressa (Lamarck, 1819). A.
H. (H.) narracanensis (Cotton & Gabriel, 1932). A.
CORBICULIDAE
Corbiculina angasi (Deshayes, 1830). A.
SPHAERIIDAE
Sphaerium (Musculium) tasmanicum (T.-Woods, 1876).A.
Pisidium casertanum (Poli, 1795).A.

Trees that establish themselves on trunks of tree ferns and a Yellow Box that enclosed its own sawn-off stump

Just as described in C. H. Henshaw's interesting article on tree ferns, Myrtle Beech and Blackwood growing together (Vic. Nat. Oct. 1978), trees often begin life on tree ferns in gullies in Gippsland where conditions are frequently much like those in the Otways. Seeds of Sassafras *Atherosperma moschatum*, Myrtle Beech *Nothofagus cunninghamii*, Blackwood *Acacia melanoxlyon* and, most commonly Banyalla *Pittosporum bicolor*, all germinate freely in the fibre of living tree ferns; sometimes they "take over" wholly or, more often partly, enclosing the fern trunks. I once searched for a Banyalla growing naturally anywhere but on a tree fern and found none—although I have since done so.

This reminds me also of a tree growing over its own trunk which I have watched for more than 60 years.

A Yellow Box tree *Eucalyptus melliodora* growing on the roadside at Tyers had been sawn off about 2ft 6ins (76cm) above the ground during or just before 1914, for in July of that year it had no coppice growth. No one measured it but it was big enough for two of us as children to sit on at the same time.

A coppice shoot came out of the stump that spring and became a sapling pressed so closely against the bark that it actually united with the trunk, and in succeeding years began to grow over it. By 1976 the stump was completely enclosed. Now the only sign that the tree was once cut down is an irregular thickening near the base.

Jean Galbraith, Tyers

Erratum
In Victorian Nat. Vol. 95 Jan.-Feb. 1978 Article on The First Victorian and other Victorian records of the Little Pigmy Possum *Cercartetus lepidus* (Thomas). p. 7 "Lat. 36°50S should read Lat. 35°50'S . . ."

NEW SUBSCRIPTION RATES FOR 1979

Subscriptions are due on the 1st January 1979 check the back page of this issue for the correct subscription rate and assist the Club by posting your sub. early.

Post direct to Subscription Sect.

Behaviour in a Group of Wild Echidnas

BY K. JOHNSON*

Introduction

Echidnas, *Tachyglossus aculeatus* (Shaw, 1792) normally occur as lone individuals but on rare occasions they are seen in small groups (Augee *et al.*, 1975). Most groups have been seen during the breeding season (Augee *et al.*, 1975) which lasts from the end of June until early September (Griffiths, 1968). There are only two reports of mating being observed in echidnas (Griffiths, 1968) despite the 186 years that they have been known to science. This fact emphasises how seldom echidnas are seen in groups of two or more individuals.

Echidnas are common animals (Ride, 1970) and obviously males must be able to find oestrous females during the breeding season. However the mechanism by which they do so is unknown. Dobroruka (1960) observed echidnas leaving a scent trail by rubbing their cloacas on the ground. Augee *et al.* (1975) considers this action to be related to olfactory communication between the sexes.

This paper reports suspected courting behaviour of four echidnas seen together on July 6, 1976 near Kempton (42°15'N, 147°15'E) in southern Tasmania.

Results

The echidnas were first heard moving in a patch of bracken fern *Pteridium esculentum* in a paddock of improved pasture. At 1030 hours they all clambered on to a log in the bracken and moved along it in a nose to tail formation. The following records of activities were extracted from field notes.

1033: An echidna grooms with hind claw.

1035: Echidnas two and three in the line groom as the fourth moves away from the group which is still standing nose to tail.

1036: Echidna three grooms while one and two move further along log. Third echidna follows and all three remain nose to tail.

1038: Echidna four leaves the log to sniff among sticks, returns to log only to leave again shortly. Echidna two mounts leader and grooms itself with hind leg.

1040: The three leave the log and walk, in a delta formation, 15 m towards me over short pasture cloaca of leader being sniffed all the way by a follower. Second follower cuffs leader on back continually using its forelimb.

1041: Leader senses my presence when within one metre and then veers back to the bracken, pursued by its intensely interested followers.

1042: Fourth echidna leaves bracken and moves rapidly towards me along the same line taken by the previous three. It appears unaware of me but turns where the others did and follows their path back to the bracken.

Discussion

The group members were not sexed because disturbance would probably have upset their behaviour as I had anticipated that copulation might be witnessed. Nevertheless their behaviour strongly suggests that the leading individual was a female and that the three followers were males Dobroruka. (1960) observed a male echidna mounting a female before they adopted an abdomen to abdomen mating position, and sniffing of the urinogenital openings and cuffing is associated with sexual checking in macropods (Johnson, 1977).

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Because the group was observed during the breeding season it is most probable that their interactions were part of the normal courting behaviour of echidnas.

The fourth individual may have simply been following a nondescript odour left by the preceding three. However it may have followed the same cloacal scent which was so interesting to one of the leader's followers.

The above observations support Augee's *et al.* (1975) hypothesis of olfactory communication. Certainly a male would have little chance of intercepting an oestrous female if both were moving randomly about their home ranges. The probability of three males locating the same oestrous female at the same time by chance is even smaller. However this probability would be greatly increased if there was a long scent trail which males could first encounter and then follow to the female.

Acknowledgements

D. Rounsevell and J. Wapstra made helpful criticisms of the manuscript.

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Open days at FNCV Kinglake Nature Reserve

Open days at Kinglake will resume again in February and March. On the first Sunday of the month, members and their friends or other interested persons are invited to visit the FNCV property at Kinglake. Stay for as little or as long as you like. Follow the nature trail, go for a hike, do some odd jobs if you bring a rake or a spade, or simply laze and chat.

The property is equipped with toilets, barbecue (not to be used on fire-ban days) and tank water. A member of the Kinglake Committee will be in attendance and will open the McMahon Road gate at 10 a.m. Drive in, keep to the left and angle park. See location map in February 1978 issue page 38.

FNCV members can enter at any time from the McMahons Road by the pedestrian entrance, and FNCV campers are welcome. Become familiar with your property.

Delay to Victorian Naturalist Subject Index 1884-1977 1978

Final proof-reading and printing of the Subject Index was expected to be complete by December but delays have occurred. Proof-reading revealed so many faults plus the desirability to improve page layouts that it was decided to type the whole thing again - for the third time. The Subject Index is a huge undertaking and our workers are still at it. Now we realise it cannot be printed this year. We apologise to all who have paid the pre-publication price and ask their forbearance. We expect, hope, it will be available by February or March 1979, complete with addendum to 1978. Please be patient.

FNCV Queensland Excursion 1978

22nd July-5th August, 1978

BY J. WALL*

At 7 a.m. on Saturday, 22/7/78, 22 members boarded the aircraft for Proserpine and the Barrier Reef. On our arrival at Proserpine we transferred to an Ansett Coach which took us through cane country to Airlie Beach near Shute Harbour, where we met two more members.

Hook Island

Next day a boat trip was arranged for us to Hook Island, South Molle and Daydream Island—to Hook Island where we were taken in glass-bottomed boats to view the coral reef and fish of every conceivable shape and size endowed with beautiful colours. The various corals that we saw were the Brain coral *Platygy laneluna* which has a peculiar structure resembling the human brain, the Mushroom coral *Fungia* which is approximately 4-5 ins. across and is only a single polyp, the Staghorn *Acropora Rebes* with its great antler-like forms, and the delicate branching patterns of the Fern and Fan corals. Bedded among the corals were the giant clams whose shells are well camouflaged, but the wavy opening of the shell reveals the glorious colours of the fleshy mantle. From there we went ashore and descended into the underwater observatory which is situated on the edge of the reef. There we viewed corals and a variety of brilliantly coloured fish through the glass portholes and one very large fish the Maori Wrasse was of great interest as he attains the weight of up to 80 pounds. A Reef heron was seen on a mooring buoy, and cormorants diving for fish in the Bay.

*FNCV, Traralgon & Latrobe Valley Field Naturalists Clubs.

South Molle Island

Our next call was at South Molle Island and we were delighted to see Lorikeets feeding in abundance, also Pied Currawongs were feeding from the hand of a gardener.

Daydream Island

Daydream Island was our next stop for a short stay where we observed the Beach Curlew, this ended our first day.

Monday we had a half day bus trip which took us through cane fields to Cedar Creek Falls but unfortunately little water was flowing. The Waterfall drops down in the midst of palms and rain forest which are embossed with fern—Staghorns, Elkhorns and Orchids. In some of the trees could be seen hanging from a branch the large rounded nests of the green tree ants which are composed of leaves drawn and cemented together in a remarkable way. On the way back to the main road a number of grass trees were seen, these are a different variety to the Victorian species as the trunk is shorter and the flower stem is very slender and straight with the flower head at the apex. Our next stop was at Conway Beach where numerous birds were seen—Egrets, Reef Heron, Curlews, and Sooty Oyster Catchers also we observed an army of Soldier Crabs *Mictyris longicarpus* scuttling across the sand and burying themselves with amazing speed. The afternoon was spent browsing about Airlie Beach.

Wildlife Sanctuary

The next day we were picked up by courtesy car and taken to the Wildlife Sanctuary which is approximately 12 h.a. of landscaped bushland where native fauna is allowed to roam free.

Kangaroos, Wallabies (there were 5 species), Cape Barren Geese, Magpie Geese, Swans and various Ducks, Emus and Scrub Turkeys all gathered for feeding time. Here we saw the Blue Winged Kookaburra which differs from the Victorian counterpart by its blue wing and inability to laugh. Also seen were Peaceful Doves, Leaden Flycatchers, Yellow Sunbirds, Lorikeets and Currawongs.

Long Island

Another boat trip was arranged for us on Wednesday to go to Happy Bay on Long Island which is at the moment unspoiled by too much commercialism. We were disembarked from the boat on to a punt which was driven by twin outboard motors then transferred to a motorised landing vehicle which took us ashore. Quite a variety of birds were seen on the walks, such as the Scrub Fowl, Golden Bronze Cuckoo, Rufous Fantail, Spectacled Flycatcher, Silvereye, Yellow Sunbird, Mistletoe Bird, Brush Turkey, Helmeted Friar Bird, Rainbow Lorikeet, Leaden Flycatcher, Indian Turtle Dove and Southern Curlew and Hibiscus, Poincianas, Coconut Palms and Pandanus Palms grew in abundance.

A free day was agreed for Thursday and we followed our own interests. Owing to inclement weather early on Friday no trip was arranged, but some of us booked another cruise to Happy Bay to explore further while others spent the day in Conway National Park.

On Saturday a bus was chartered and we were taken to see the **"Sausage Tree"** *Kigelkia pinnata*. This tree has a fruit which grows to approximately 2 feet long in the shape of a sausage and hangs from the branches on long stems. It is a native of Tropical Africa and is regarded asacred by the Nubians. From there we went to Shute Harbour and from the Lions Lookout magnificent views of the **Whitsunday Passage** were obtained.

Mandalay Coral Gardens

Our next stop was at Mandalay Coral Gardens where live coral was being grown above sea level in ponds and a running commentary was in progress relating to the various corals and fish, also a full colour documentary on the fascinating Great Barrier Reef was shown. We had lunch near the pools and then off to our next place of interest, which was the Dittmer Nursery and Dittmer gold mine situated near Proserpine. The nursery in itself was set in admirable surroundings and only a short walk from the gold mine. The mine was abandoned after water had reached the proportion too great for the pumps to handle but a lot of equipment was still left there; on our way back to Airlie Beach we stopped to photograph the cane which looked like a sea of silver in the setting sun.

Eungella National Park

On Sunday morning we were picked up by a chartered coach and taken to Eungella National Park which is situated 2,500 feet above the Pioneer Valley. The park covers an area of 49,615 h.a. (122,600 acres) and is shaped roughly like a miniature South America. Various walking track systems exist in the park south of Eungella township and magnificent views of Pioneer Valley and the canefields can be seen from various lookouts on the Range. Numerous birds were seen in the school grounds which skirted the edge of the rain forest and to the delight of members we saw the **Regent Bower Bird** in all its golden glory. We were fortunate to have the Ranger accompany us on one of the walks and explain the jungle type growth which of tree ferns, orchids, massive gums and cedars made the scenery unforgettable; he also mentioned that botanists come from all over the world to this particular area because of the merging vegetation of north and south. We visited **Broken River** where a **platypus colony** lives, and were fortunate to see a platypus feeding on the bottom. A few of us walked the 2½ km walk through the rain forest and finished up at the Chalet with a few leeches and

mosquito bites. We also did a trip to the Eungella Dam and we were fortunate to see **Rock Wallabies** on the Dam wall. This Dam supplies water to Goonyella coalfields, Moranbah and the Colinsville power station. The Aboriginal meaning of Eungella means land of cloud and truly it is so as every morning we were enveloped in cloud until about 10 o'clock when the mists began to lift.

Mackay

At last the time came for us to leave this beautiful but awe inspiring place and descend to the low country and make our way to Mackay where we stayed overnight. Before going to our Motel we visited the Mackay sugar terminal and the man-made breakwater. A stop was made at the harbour beach which is a popular picnic and swimming spot. The coach driver then took us to a lookout that overlooked the harbour and the township of Mackay, finishing with a tour round the town.

Hillsborough National Park

The next day we left Mackay on the last leg of our journey to the Cape Hillsboro' National Park driving north along the Bruce Highway and turning just past the picturesque Leap Hotel. We paused for a few moments at **Mount Jukes Lookout** for a view of the prettiest valley in the area and then on to Cape Hillsboro' Lookout with its vista of the coast, islands and lakes. Finally we arrived where it was arranged for us to go on an escorted walk to **Hidden Valley.** Scores of butterflies fluttered around us as we walked (blues and browns) Poplar or White Gum Trees *Eucalyptus alba* Blackboys *Xanthorrhoea sp.* White Fig *Ficus virens* Palms *Ptychosperma elegans* Blue Quandong *Elaeocarpus grandis* Cluster Fig *Ficus racemosa* Pandanus Palm and Lantana Vines were noted. Back to the camp site where a B.B.Q. lunch was waiting for us. At the conclusion of lunch we boarded the coach and were taken to **Cape Hillsboro' swamps** where we were fortunate to see very many **Brolgas** dancing in the swampy area and from there to see the Shining Starling tree with its peculiar pear shaped nests hanging from the branches; on our way to Airlie Beach we were lucky enough to see a cane fire of which some members took photographs.

Our last day at Airlie we all decided to go back to Happy Bay, and walk to Palm Bay, and possibly to Sandy Bay, which was approximately 2½-3 miles further along. An arrangement with the management was made to have our lunch at Palm Bay and this was the completion of a lovely holiday.

FNCV TRIP
22nd JULY—5th AUGUST, 1978
Airlie Beach, Whitsunday Islands, Eungella National Park, Mackay and Cape Hillsborough:
LIST OF BIRDS—127 SPECIES

Name	Location
Scrub Fowl	Happy Bay
Brush Turkey	Eungella/Happy Bay
Red-crowned Pigeon	Cape Hillsborough
Purple-crowned Pigeon	Eungella
Brown Pigeon	Eungella
Spotted-turtle Dove (Intro.)	Mackay
Peaceful Dove	All
Bar-shouldered Dove	Happy Bay
Green-winged Pigeon	Palm Bay

Name	Location
Black-tailed Native-hen	Eungella Dam
Dusky Moorhen	Eungella Dam
Coot	Eungella Dam
Little Grebe	Eungella Dam
Crested Grebe	Eungella Dam
Crested Tern	Airlie Beach/Hook Is.
Silver Gull	All
Pied Oystercatcher	Conway Beach
Sooty Oystercatcher	Airlie Beach
Spur-winged Plover	All

Name	Location
Red-capped Dotterel	Conway Beach
White-headed Stilt	Cape Hillsborough Swamps
Australian Curlew	Mackay
Greenshank	Wildlife Turn-off Dam
Southern Stone Curlew	Heard— Airlie Beach
Brolga	Cape Hillsborough Swamps
White Ibis	All
Straw-necked Ibis	Cannonvale/ Turn-off Dam
Royal Spoonbill	Airlie Beach
Yellow-billed Spoonbill	Wildlife Sanct. Road
Jabiru	Mackay/Airlie Beach
Little Egret	Conway Beach
Plumed Egret	Wildlife Turn-off Dam
White Egret	All
White-faced Heron	All
White-necked Heron	Proserpine Road
Reef Heron (grey phase)	Mandalay/Palm Bay
Mangrove Heron	Mandalay Coral Gardens
Black Swan	Eungella Dam
Maned Goose (Wood Duck)	Eungella Dam/C Hillsborough
White-headed Shelduck (Burdekin)	Cape Hillsborough Swamps
Grey Duck (Black)	All
Grey Teal	Eungella Dam
White-eyed Duck (Hardhead)	Eungella Dam/W'life Turn-off Dam
Black Cormorant	Airlie Beach
Little Black Cormorant	Eungella
Little Pied Cormorant	Eungella/Airlie Beach
Australian Darter	Wildlife Turn-off Dam
Pelican	All
Australian Goshawk	Airlie Beach
Wedge-tailed Eagle	Proserpine Road/ Bloomsbury
White-breasted Sea-Eagle	Airlie Beach/Mandalay/ Islands
Whistling Eagle	Canefields-Proserpine Road
Red-backed Sea-Eagle (Brahminy)	Airlie Beach/Mandalay/ Islands
Fork-shouldered Kite (Black)	All
Black-shouldered Kite	Eungella Bridge Area
Crested Hawk	Dittmer Mine/Mackay
Little Falcon	Mackay
Brown Hawk	Canefields-Pros. Rd.
Nankeen Kestrel	Shute Harbour/ Cannonvale
Osprey	Airlie Beach/Islands
Boobook Owl	Airlie Beach/C. Hillsborough
Rainbow Lorikeet	Airlie Beach/S. Molle
Red-tailed Black Cockatoo	Eungella Bridge Area
White Cockatoo	All
King Parrot	Eungella School Grounds/Broken R.
Pale-headed Rosella	Eungella School Grounds/Broken R.
Tawny Frogmouth	Happy Bay
Laughing Kookaburra	All
Blue-winged Kookaburra	Canefields Pros. Rd /S. Molle/Mirani
Sacred Kingfisher	Airlie Beach
Forest Kingfisher	Airlie Beach
Rainbow Bird	Airlie Beach/Eungella
Fan-tailed Cuckoo	Airlie Beach
Golden Bronze Cuckoo	Happy Bay
Horsfield Bronze Cuckoo	Airlie Beach
Pheasant-Coucal	Airlie Beach/Eungella/ C. H'borough
Welcome Swallow	All
Tree Martin	Dittmer Mine
Fairy Martin	Canefields
White-breasted Wood-swallow	All
Lemon-breasted Flycatcher	Dittmer Mine
Grey Fantail	All
Northern Fantail	Airlie Beach
Rufous Fantail	Happy Bay
Willy Wagtail (Black & White Fantail)	Eungella
Leaden Flycatcher	All
Restless Flycatcher	Mackay Road/Eungella
Spectacled Flycatcher	Con. Nat. Park/Happy Bay/Dittmer Mine
Black-faced Cuckoo-shrike	All
Varied Triller	Eungella School Grds./ C. H'borough
Eastern Whipbird	Heard—Eungella School G
Reed Warbler	Eungella Dam
Little Thornbill	Conway Nat. Park— Ranger Office
Brown Thornbill	Eungella School Grds.
Red-backed Wren	Airlie Beach/Cattle Ck.
White-Browed Scrub-wren (Buff-breasted)	Eungella Rainforest
Magpie-Lark	All
Grey Shrike Thrush	All
Rufous Shrike Thrush	Dittmer Mine
Black-backed Magpie	Eungella/Proserpine Airport
Pied Butcher-bird	Eungella Bridge/Broken R.
Rufous Whistler	
Golden Whistler	Eungella School Grds.
Northern Yellow Robin	Eungella School Grds
White-headed Sittella	Cattle Creek
Silvereye	Eungella School Grds / Happy Bay
Mistletoe-bird	All
Striated Pardalote	Airlie Beach
Yellow-breasted Sunbird	Airlie Beach/Happy Bay
White-throated Honeyeater	Airlie Beach
Dusky Honeyeater	All
Eastern Spinebill	Eungella School Grds
Lewin Honeyeater	All
Mangrove Honeyeater	Airlie Beach
Yellow Honeyeater	Airlie Beach
Blue-faced Honeyeater	Airlie Beach
Helmeted Friar-bird	All
Pipit	Mandalay Road

Name	Location	Name	Location
House Sparrow	Airlie Beach	Olive-backed Oriole	Plant Nursery/Dittmer Mine
Red-browed Finch	Fungella Dam		
Nutmeg Finch (Intro.)	Airlie Beach/Mackay	Southern Figbird	All
Shining Starling (old nests—Cottonwood or Cork tree)	C. Hillsborough area	Spangled Drongo	Airlie Beach
		Regent Bower-bird	Fungella School Grds
		Crow	All
		Pied Currawong	All

In memory of Keith Rogers 1896-1978

Keith Rogers, who died last April just before his 82nd birthday, was a long-standing member of the FNCV which he joined in 1953. He was also a valued member of the Bairnsdale and Latrobe Valley clubs, and attended many Bairnsdale meetings although he had to travel 90 miles each way to do so. During the years 1965-77 he missed only one of the alpine campouts held each January by the two clubs, and on that one occasion his unobtrusive but ever-helpful presence was missed very much. He knew the mountains of eastern Victoria and their flora better than any of us and his knowledge was freely shared. He had lived at Black Mountain Wulgulmerang since he was 7, and knew every mountain and valley and meadow and its flora and had a named collection of the plants of the whole district.

During those years he found many rare and several undescribed species including *Monotoca rotundifolia* J. H. Willis and *Corybas hispida* D. C. Jones and others still unnamed. *Helichyrsum rogersianum* was named in his honour by Dr. Willis (Muelleria Vol. 1, No. 3). One hopes that one day we may have a full record of his collections.

He also rediscovered the Brush-tailed Rock-wallaby in Victoria[1] and, with Mr. L. Hodge, searched the gorges on and near the Snowy, finding in all about 15 colonies. These he recorded and discussed with details of habits and habitats in a valuable article in "The Clematis" Vol. 1, No. 1 (1962)[2]. He was a valued contributor to the "The Clematis" (with articles in all but two of its past 16 issues) and also to the "Latrobe Valley Naturalist', and wrote occasionally for "The Victorian Naturalist"—see for example "Wattle Time by the Snowy River".[3]

The stories of his expeditions among plants, alone or with friends, would be worth hearing. Norman Wakefield in "Naturalists Diary' describes a trip shared with him to Reedy River Gorge which Mr. Rogers had discovered a year earlier. His last expedition only a few months before he died was with Mr. Bill Cane to the Kybean Range in search of *Persoonia* species. He commented in a letter written last February—"Of course I enjoyed it, but eyes and legs are not what they were. However, I'll be 82 in April so I have good reason to count my blessings."

He served his own district in many ways, representing it for 30 years on the Tambo Shire Council, and enlisted as a stretcher-bearer in the 1914-18 war. A friend of many naturalists and with wide knowledge in his own field, he always credited his friends with greater knowledge than his own and considered their comfort and pleasure before his.

At his funeral the church was crowded with young and old, a tribute to what he was as well as an expression of sympathy for Mrs Rogers, their daughter, two sons, and his brother. His deep religious faith coloured and enriched his life and a characteristic remark when he described some plant he had seen was "One does thank God for the beauty of it all."

Jean Galbraith

1. *Vic. Nat.* March 1954
2. *The Clematis*, annual magazine of Bairnsdale FNC.
3. Vic. Nat. Oct. 1960.

The impact of development in Wollongong on the environment during the past fifty years.

1978 Natural History Medallion Speech

BY ALAN SEFTON

The area known as Illawarra is still acclaimed for its natural beauty and in the past has often been referred to as the "Garden of New South Wales".

The district zoologically extends from Stanwell Park in the north to the Shoalhaven River in the south, a distance of some 130 kilometres. It takes in the Illawarra and Cambewarra Ranges on the west and includes the water catchments on the highlands beyond. A natural eastern boundary is provided by the usually placid blue waters of the Tasman Sea.

The bulk of the population is confined to the northern section and is congregated mainly around the industrial centres of Wollongong and Port Kembla. Rural activities still predominate in the south.

The dominant features are a narrow coastal plain, a steep scarp and deeply dissected plateau of moderate elevation in the west. The coastline is characterised by rocky cliffs and headlands interspersed with golden crescent beaches.

The district was once the hunting ground of an aboriginal tribe known as the Wodi-Wodi and artifacts made by them have been found extensively throughout the area.

There are many caves and overhangs, mostly west of the escarpment, which were used as shelters by the aborigines during their seasonal walkabouts. Within these caves have been found many beautiful paintings and drawings—dramatic and nostalgic reminders of the art and culture of an ancient people vanished completely into the dreamtime.

The Illawarra district is endowed with a wide variety of plant life and may be divided roughly into three categories. These are the savannah or open woodland and healthland on the highlands west of the escarpment, the hardwood rainforest and remaining pockets of subtropical jungle known as 'brush' on the escarpment itself, and a few areas of the coastal plain in the south where the vegetation consists mainly of various types of Casuarina, Melaleuca and Leptospermum. We have many varieties of the national floral emblem, the Acacia or Wattle, and of course the brilliant blood-red Waratah representing New South Wales. The spectacular crimson Flame Tree which proudly bears the district's name of Illawarra still thrives along the escarpment and in many home gardens. As Australia's greatest industrial area today mention should be made of the legendary cedar-cutters of the early eighteen hundreds—Illawarra's first large scale industrial enterprise. Over-exploitation resulted in the almost total removal of the species from the area and mature Red Cedars are now showpieces and rigidly protected.

The Illawarra birdlist contains 320 species which is about forty-seven per-cent of those on the Australian Checklist. Included in the total are permanent residents, summer and winter migrants and several, mainly seabirds, whose occurence is extremely rare. There is a rich variety comparable to any area of similar size in the world. The remarkable Spine-tailed Logrunner must rate a mention as the first specimen to be scientifically described was collected on Mount Kembla in 1804.

There is also a small brown bird whose claim to fame is that it is only found in New South Wales and no other State — a vestigial counterpart to Victoria's

Helmeted Honeyeater. The range of the Rock Warbler conforms roughly to the regions of Hawkesbury Sandstone so therefore is not uncommon throughout the Illawarra district.

In a district which is essentially a strip of coastline it is only natural that seabirds should make up an important part of the bird fauna. From September to February the Five Islands Nature Reserve off Port Kembla becomes a veritable city of seabirds.

Many rare and unusual seabirds are on the Illawarra list due to diligent patrolling of the sea beaches. In fact there are species on the list that constitute the first New South Wales and even the Australian records.

Since 1953 local ornithologists have been co-operating with the CSIRO in the systematic study of birds by banding, the fixing of numbered metal bands to their legs. One project that has attracted world-wide interest has been the ringing of the fabled Wandering Albatross, the largest of flying seabirds, on the open sea off Wollongong.

Many native animals can still be found close to Wollongong and this is primarily due to the strict supervision on the Sydney and South Coast water catchments west of the escarpment. Wallabies and Wombats are not uncommon and the two egg-laying monotremes, the Platypus and Echidna, are still quite plentiful. Illawarra beaches still get the occasional visit from a Fur Seal or Leopard Seal.

The first blast furnace at Australian Iron & Steel Pty. Ltd., was commissioned in August 1928 and a grotesque new species had appeared in the hitherto pristine "Garden of New South Wales". Since that time there has been considerable conflict between heavy industry and the environment. This reached a peak during the years of exceptional industrial growth in the fifties and sixties when Wollongong could not civically and environmentally cope with the enormous migrant intake of that period.

I first became interested in conservation in the late thirties when I noticed large numbers of dead and dying fish in Allans Creek when travelling by train each day to work. Birds consumed the contaminated fish with agonising consequences and so commenced an individual battle with industrial pollution that has been going on for over forty years. Allans Creek was once a beautiful tree-lined waterway but is now located in the heart of today's industrial colossus and is completely sterile — nothing more than a drain and monument to an initial environmental problem that never went away and progressively worsened.

Heavy industry in Wollongong has always acknowledged the massive environmental problems it has created and has spent astronomical sums attempting to combat its own technological abuse of the environment. As mentioned previously my association with heavy industry has lasted for well over forty years yet I have never been reprimanded for the at times pertinent stands I have taken in the cause of preserving the environment. I must freely admit that it has been an exhilarating experience being personally and directly implicated in the industrial expansion of Wollongong during its most progressive period.

As the only group concerned with the environment based in Wollongong in the twenty years period up to 1968 the Illawarra Natural History Society not only recorded and classified the natural history of the area, but also dealt with all conservation issues during this most hectic interval in Wollongong's development.

During the last decade however the membership of Illawarra's pioneering environmental organisation has declined considerably but in that time has mothered and nurtured many specialist groups. Illawarra now has an Astronomical Society, Geological Society, Bird

Observers Club, a branch of the Society for Growing Australian Plants, Aboriginal Pre-history Group, and above all a large and influential South Coast Conservation Society which capably and efficiently deals with controversial issues both inside and outside the Illawarra district.

I feel the long battle has not been in vain. Australia's greatest industrial complex remains in an area of great natural beauty and scenic charm. We certainly have had our problems but now have stringent laws controlling water and air pollution, the control of excessive noise, and environmentally the future is looking much rosier. The great conservation battles of past years have made Illawarra citizens acutely aware that they themselves are an integral part of the environment and a reasonable ecological balance must be maintained if the quality of life they now enjoy is to continue.

It is interesting to note that the first recorded reference to the Illawarra district comes from Captain Cook's Journal.

"Wednesday 25th (April 1770) . . . is a point which I called Red Point; some part of the land about it appears of that colour. A little way inland to the NW of this point is a round hill, the top of which looked like the Crown of a Hatt".

Historians tell us that Captain Cook's Hatt Hill is Mount Kembla today therefore the erstwhile mariner must have been gazing across the site of today's vast industrial complex at Port Kembla.

What a change Captain Cook would see today. I suppose the same could be said for the aboriginals that furtively peered from the shore as Cook sailed northwards along the Illawarra coast. The aboriginal workshops, in contrast to the mighty steel furnaces of today, were the open sandstone areas where they, using only water and muscular power, shaped and polished primitive stone tools to their specific individual taste and requirements.

As time goes by the remains of this ancient culture will vanish under closer settlement and as far as the Illawarra district is concerned it can definitely be said that steel has replaced stone within a century.

As mentioned earlier the transition has not been easy but I can vouch that Wollongong citizens now fully realise that they must live in harmony with the environment it they continue to dwell in "The Garden of New South Wales".

Blue-tongue Lizard survives a Jonah-like experience

Accompanied by my large labrador dog, I take a daily walk deep into the bush of the Warby Ranges. Often I see some interesting and amusing sights.

One morning the dog pounced on a small blue-tongued lizard (about 20cm long) and swallowed it with one big gulp. A glazed look appeared in the dog's eyes and he stood still for half a minute, obviously not at all happy with his meal. He took the sensible course and regurgitated it. The lizard ran off up the hill.

This experience, I'm pleased to relate, has been the dog's only attempt to eat any of the wild life that abounds on our property.

I.C.M

Carabid Beetle Preying on Frogs

BY M. J. LITTLEJOHN AND J. W. WAINER*

Predation of larval and adult anuran amphibians by aquatic invertebrates is well known (e.g. Savage, 1961), but there are few reports of predation on frogs by terrestrial arthropods. McKeown (1952) recorded an observation of a tree funnel-web spider, *Atrax formidabilis* Rainbow, feeding on a green tree frog, *Hyla* (now *Litoria*) *caerulea* (White). Main and Main (1956) found a theraphosid trap-door spider, *Selenocosmia crassipes* L. Koch, with a mutilated, web-encased specimen of the burrowing frog, *Heleioporus* (now *Neobatrachus*) *centralis* (Parker), in its burrow. Butler and Main (1959) reported that the remains of 13 adult specimens of the brown froglet, *Crinia* (now *Ranidella*) *pseudinsignifera* (Main), were found in the burrow of a mygalomorph trap-door spider, *Aganippe rhaphiduca* Rainbow and Pulleine. Nash (1962) recorded an incident at Snobs Creek, Victoria, in which a large brown mantid, *Archimantis latistyla* (Serville), was found eating a live golden bell frog, *Litoria raniformis* (Keferstein). Ridpath (1977) described observations of the capture and eating of green tree frogs, *Litoria caerulea*, by a large mantid, *Hierodula werneri* (Giglio-Tos), at Darwin, Northern Territory.

During 1977, we made two observations of carabid beetles feeding on frogs. The first was made at the edge of a gravel road in a low, swampy area at Yan Yean, 2 km SSE of Whittlesea, Victoria, on October 9th. A large carabid (body length=32 mm), *Catadromus lacordairei* Boisduval (Family Carabidae, Subfamily Pterostichinae), was attached to the lateral pectoral region of a live adult female (snout-vent length=38.5 mm) of the spotted marsh frog, *Limnodynastes tasmaniensis* Günther. The beetle was chewing deeply into the tissue of the frog, and had penetrated the cardiac region when first located. There were also lacerations in the ventral pelvic region and behind the left eye of the frog. The animals were placed in a plastic bag for further observation, and the beetle continued to feed in the pectoral region. The frog was dead one hour later.

On November 9th, at the margin of a small permanent swamp at "Strathfieldsaye", Perry Bridge, about 19 km SE of Stratford, Victoria, a second specimen of *C. lacordairei* (body length=31 mm) was found feeding on a recently-metamorphosed individual (snout-vent length about 12 mm) of the brown tree frog, *Litoria ewingi* (Dumeril and Bibron). The beetle was attached to the pelvic region of the frog, and there were extensive and deep lacerations, with much of the tissue and viscera missing. The frog was freshly dead, and is assumed to have been alive when captured by the beetle. The specimens were collected and no further observations made.

These observations suggest that *Catadromus lacordairei*, because of its large size and abundance in wet grassland areas of south-eastern Australia, may be a significant predator on small frogs.

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Book Review

A Field Guide to the Common Genera of Gilled Fungi in Australia

by M. Cole, B. Fuhrer and A. Holland, Botany Department, Monash University.
Recommended price $8.95; to members, $6.95. Inkata Press.

This is a loose-leaf folder with a large sheet of a dichotomous key to forty common genera; three sheets of line drawings of typical representatives; and six sheets of beautiful, clear and artistic colour photos of sixty species. The cover and the sheets are plastic coated for field use in the often wet mushroom season. The necessary terms are well explained by sketches on the key sheet, and the brief text on using the key, collecting, and making spore prints is clear and devoid of technical jargon. A few errors in the botanical names are mostly trivial and due to lack of time as it was attempted to bring the key out for the 1978 seaon.

This is a very welcome and helpful aid to the field naturalist wishing to take up the study of our colourful and intriguing agarics, and will be useful to the more experienced as well.

A. W. Thies

New Books Available

"Eucalypts" Stan Kelly Volume 11 $19.95
Postage within Vic. $1.25
"A Field Guide to the Common Genera of Gilled Fungi in Australia."
Mary Cole Bruce Fuhrer Albert Holland $8.95
Postage within Victoria 70 cents
A Discount on these books available to Members

Field Naturalists Club of Victoria

Reports of FNCV Activities

General Meeting
Monday 9 October, 1978

Dr. T. Rich, Curator of Vertebrate Fossils, National Museum of Victoria, spoke upon 'Some Australian Vertebrate Fossils'.

Australian marsupial fossil remains have only been identified back as far as 25 million years. Very few fossil remains have been found to account for the great diversity of present day marsupials. Australia has extreme chemical weathering which destroys fossils, and little

geological movement to provide evidence of fossil sites and many localities have been discovered purely by chance.

Sites which are presently being excavated by Dr. Rich include the Western District, near Hamilton (4.5 mill. years); east of Lake Eyre and Lake Frome in Central Australia (15 mill. years). Winton in Queensland, contains deposits dating back 100 mill. years.

Honorary Membership Certificate was presented to Mr. Cedric Ralph for his 40 years of membership. Mr. Ralph, who joined the Club on October 10, 1938, and whose main interst is entomology reminisced upon some of his early experiences with the Club and of the personalities of the time. All members joined with the President to congratulate Mr. Ralph on his Honorary Membership.

Exhibits. Fossil shells, starfish, crinoides coral and a new species of trilobites from a sandstone quarry near Kinglake West, estimated to be 395 million years old (Lower Devonian period).

Under the microscope were some May fly nymphs, and a piece of micro film. Also displayed were the door of a trapdoor spider from Central Australia, galls on a young swamp gum, *Eucalyptus ovata*. A stone-making sclerotium about 6 inches round of *Polyporus basilapiloides* which grows in association with mallee eucalypts came from Wathe Fauna Reserve.

Several specimens of a Hover Fly (Syrphidaesp.) a piece of *Hakea ulicina,* Furze Hakea, from the coast of the Otway Ranges, an article on Black Cockatoos causing great damage to young eucalypts and another on sea horses were also displayed.

Nature Notes: One member reported that 9 sulphur Crested Cockatoos had fed on earth worms beneath grass and soil which had collected in her roof guttering. Mr. Ralph reported that fossils could possibly be found in the East Strezlecki mountains where washaways have occurred recently.

Proposals for changes to General Meetings

In view of the steady decline in attendance at General Meetings, Mr. Tom Sault has put forward several proposals upon which members are asked to comment. These include reducing the General Meetings from monthly to Quarterly. Two of these would consist of the Annual General Meeting and the Natural History Medallion meeting.

As a substitute for the other eight monthly meetings an 'Activities meeting' would ensue, designed to involve all the groups and talents of members attending. Each meeting would be preplanned by a committee comprising of representatives of each group, plus any other interested member.

Wanted: The Club is short of surplus copies of the Vic. Nat., Vol. 95, numbers 1 and 2 to be included in the library collection. Members are requested to return any copies that they no longer require back to Mr. McInnes.

Also, the bound copy of Vol. 81 of the Vic. Nat. **is missing** from the Club Library. Could members please check their bookshelves.

New Secretary and Correspondence Secretary: The President expressed pleasure in announcing the appointment of Miss Wendy Clark as Club Secretary and Mr. Arthur Thies as Correspondence Secretary. In responding, Miss Clark said that she could not have undertaken the secretary job unless Mr. Thies had also extended his temporary offer to be Correspondence Secretary.

Library: Another announcement was the appointment of Miss Madge Lester as Assistant Librarian. Miss Lester declared that the real assistant librarian was Mrs. Olive O'Hagan. Mrs. O'Hagan comes into the library each Tuesday and does a great deal of work which is much appreciated by our librarian Mr. Jon Martindale. But Mrs. O'Hagan cannot attend General Meetings, so Miss Lester

sees her job as liaison between Olive and Jon, and to check borrowings and returns. She will be in the library at all General Meetings from 7.30 p.m. onwards.

Books may be borrowed for two months; if not returned within that period, the borrower will receive a reminder notice to return the book and to refund postage cost of the notice.

Donation from Honorary Member: At the general meeting on 9th October, Mr. Cedric Ralph was presented with Honorary Membership for 40 years in the FNCV. At the end of the meeting Mr. Ralph handed a cheque to the Treasurer. Very busy at the time, the Treasurer did not open the cheque until arriving at home. It was for $250! Council decided that it would be desirable to put such a sum to a special purpose and a Cedric Ralph Account has been opened until a decision has been made regarding that purpose. The Club thanks Mr. Ralph for his generosity.

General Meeting
Monday 13th November, 1978

Presentation of
1978 Natural History Medallion

Especially welcome at this meeting were visitors and members of the Medallion Award Committee.

Professor Lovering, Department of Geology from the Melbourne University, presented the 1978 Natural History Medallion to Mr Alan Sefton. Amid the flashing of cameras, Mr Sefton thanked those associated with his work; in particular the Illawarra Natural History Society and said he felt greatly honoured at receiving this prestigious Award.

Speaker for the evening was the 1978 Award winner. Mr Sefton spoke upon "The Impact of Development in Wollongong on the Environment during the past Fifty Years". He related the problems encountered in the conflict between Australia's largest industrial area, and preserving the natural beauty and unique biological features of the Illawarra region. This area in the past has claimed the title of "Garden of N.S.W.".

Of particular interest were his tales about the local ornithologists attempting to band the Wandering Albatross on the open sea off Wollongong. These birds feed upon large squid which float to the surface after being attacked and beheaded by Dolphins.

Exhibits included four colour forms of *Stypandra caespitosa* and one of *S. glauca*, the Nodding Blue Lily. Fossils of Meekoceras; the Lower Triassic Anmonoid and Michelinoceroid from the Jurassic period, both from the N.G. Highlands. Under the microscope were seen the smallest flowering plant in the world—*Wolffia*,(the tiny duck weed) and some Copepodes. Also a sample of green water containing single-celled algae and hydra. Plastic bags contained the Oak leaf miner and moths. A specimen of *Callistemon subulatus*—The Tonghi Crk. Bottle Brush, and of *Banksia dryandroides*—the smallest of the banksias, were displayed.

Affiliation of the
Native Fauna Preservation Society.

Prior to this meeting there was an Extraordinary General Meeting at which the Native Fauna Preservation Society was elected an affiliated society to the FNCV.

Editor wanted to edit the Victorian Naturalist Journal. Please contact Dr. Brian Smith.

(Continued from page 214)

GROUP MEETINGS

All FNCV members are invited to attend any Group Meeting; no extra payment.

At the National Herbarium, The Domain, South Yarra at 8.00 p.m.

First Wednesday in the Month—Geology Group Wednesday, 6 December. Members' Christmas party. Wednesday, 3 January. To be announced at Group Meeting.
Second Thursday in the Month—Botany Group.
Thursday, 14 December. Annual General Meeting. Flowers to observe in December. Please bring specimens. slides or illustrations.
Thursday, 8 Febraury. "Topics on the History of Australian Botany" Mrs. Ducker.
Thursday, 8 March. "Red Wilderness: talk on the North-West corner of Victoria." Mark Gotch.

GROUP EXCURSIONS

All FNCV members are invited to attend Group excursions.

Botany Group

Saturday, 24 February. To be announced.
Saturday, 24 March. Thomson River, via Noojee, to find native fruit.

Third Wednesday in the Month—Microscopy Group.
December—No Meeting.
Wednesday, 17 January—Members night. Discussion to arrange programme for 1979.

At the Conference Room, National Museum at 8.00 p.m.

First Monday in the Month—Entomology and Marine Biology Group.
January 1979—No Meeting.
Monday, 5 February—Members Exhibits.

Day Group—Third Thursday in the month.
No excursion in January 1979.

Thursday, 15 February—Hampton—meet at Hampton railway station at 11.30 a.m.
Thursday, 15 March—Polly Woodside Maritime Museum.
Thursday, 19 April—Train outing to Diamond Creek.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora
Members include beginners as well as experienced naturalists

Patron:
His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

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FNCV Kinglake Nature Reserve: McMahons Road, Kinglake.
Bookings and keys: Mr. DICK MORRISON, 788 Elgar Road, Doncaster (848 9148)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1979

Metropolitan	$12.00
Joint Metropolitan	$14.50
Country Members and Retired Persons	$10.00
Joint Country and Joint Retired	$12.00
Junior	$2.50
Subscription to Victorian Naturalist	$10.00
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